Proposed Plan **Date: July 11, 2022**
Little Scioto River Superfund Site, Operable Unit 02
Marion County, Ohio

A. INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Plan to present EPA's Preferred Alternative for actively remediating groundwater contamination at Operable Unit 2 (OU2) of the Little Scioto River (LSR) Superfund Site (Site) in Marion County, Ohio. The Site has been divided into two operable units. OU 1 includes the contaminated stretch of Little Scioto River. OU 2 includes the former Baker Woods Creosoting facility (BWC Facility or Facility).

EPA is the lead agency for Site activities. EPA, in consultation with the Ohio Environmental Protection Agency (Ohio EPA), will select a final remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with Ohio EPA, may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan to fulfill its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan highlights key information that can be found in greater detail in the Final Remedial Investigation (RI) and Feasibility Study (FS) reports and other documents contained in the Administrative Record file for the Site. EPA and Ohio EPA encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site. Site documents can be found on EPA's website for the Site (www.epa.gov/littlesciotoriver) or at the following locations:

Marion Public Library
445 E. Church Street
Marion, Ohio
(740) 387-0992
Monday - Wednesday: 9:00 AM-7:00 PM
Thursday - Friday: 9:00 AM-5:00 PM
Saturday: 10:00 AM-3:00 PM

EPA Region 5 Records Center
77 W. Jackson Boulevard (SRC-7J)
Chicago, Illinois 60604
312-886-0900
Mon-Fri: 8 a.m. to 4 p.m. – Call for appointment

The remedial alternatives that EPA evaluated for the surface soil, subsurface soil, and groundwater contamination at the Site are detailed in the FS Report. The evaluated remedial alternatives are listed in Table 1 below. Each of the active remedies evaluated also include long-term monitoring (LTM) and institutional controls (ICs) to prevent future exposures to contaminated groundwater.

Table 1: Site Remedial Alternatives

Media	Alternative Number	Alternative Title
Surface Soil	1	No Action
	2	Asphalt Soil Capping
	3	Surface Soil Excavation and On-site Consolidation
	4	Excavation and Disposal Off-Site
Subsurface Soil	1	No Action
	2	Excavation and Off-site Disposal
	3	Thermal Conduction Heating
	4	In Situ Stabilization and Chemical Oxidation with Sodium Persulfate and Lime
Groundwater	1	No Action
	2	Monitored Natural Attenuation (MNA)
	3	Enhanced Biodegradation
	4	Extraction and Treatment

EPA's Preferred Alternative for remediation of contaminated surface soil at OU2 is excavation and off-site disposal. EPA’s Preferred Alternative for remediation of contaminated subsurface soil at OU2 is in-situ stabilization and chemical oxidation with sodium persulfate and lime. EPA’s Preferred Alternative for remediation of contaminated groundwater at the Site is enhanced biodegradation. More details about the Preferred Remedial Alternatives are provided later in this Proposed Plan. The estimated cost to implement the Preferred Remedial Alternatives is $16.10 million.

EPA’s final decision on the remedy for OU2 at the Site will be announced in local newspaper notices and presented in an EPA document called a Record of Decision (ROD). The ROD will include a Responsiveness Summary that summarizes EPA’s responses to public comments on this Proposed Plan. Based on new information and/or comments received during the public comment period, the selected remedy may differ in some respects from the details of the Preferred Alternatives presented in this Proposed Plan.

B. SITE BACKGROUND

1. Site Description

The Little Scioto River OU2 Superfund Site encompasses the former Baker Woods Creosoting (BWC) facility (BWC Facility or Facility). The former BWC Facility is located at the northwestern corner of the intersection of State Route 309 and Holland Road in Marion, Marion County, Ohio (Appendix A). A combined sanitary and storm sewer located along the southern border is present beneath Holland Road, flowing west, and discharges directly into North Rockswale Ditch (NRD). NRD flows south under Holland Road to the combined sewer outfall gate, then turns west and flows directly into the Little Scioto River (LSR). The Site was generally divided into an eastern (BWC-E) and western (BWC-W) portion during the remedial investigation (RI) for the purposes of Site investigation due to the difference in historic use (Appendix B). BWC-E consists of 25.9 acres of mostly open land, which is not heavily vegetated and contains the former bioremediation area and the former processing area (when operations were active). BWC-E is mainly covered with overgrown weeds and grass with limited trees and some concrete footers remaining in the ground. BWC-W consists of about 34.1 acres of dense wooded area and contains the location of the former drying area. The BWC Site is within an area subject to minimal flooding, and is not in a mapped flood zone. Soil and groundwater contamination at OU2 is primarily found in the southern portion of BWC-E around the former bioremediation area.

The contaminants of concern (COCs) at OU2 are summarized in Table 2 below. There are 9 COCs for OU2 which include various polyaromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals.

Table 2: Contaminants of Concern for the BWC Site.

COCs		Groundwater	Soils
PAHs	BaPE*	X	X
	Napthalene	X	X
VOCs	Benzene	X	X
	Ethylbenzene	X	X
SVOCs	1-Methylnaphthalene	X	-
	2- Methylnaphthalene	X	-
	1, 1'-Biphenyl	X	-
	Dibenzofuran	X	-
Metals	Arsenic	X	X

*BaPE is a representation of the seven carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene).

2. Site History

The former BWC Facility operated as a lumber preserver from the 1890s until the 1960s. Lumber, including railroad ties, was preserved with coal tar creosote, petroleum, and other organic preservatives in pressurized tanks. An 1892 Sanborn insurance map indicates that railroad ties were preserved with coal tar creosote in the processing area in BWC-E and then stacked to dry in BWC-W. Based on other wood treating sites, it is possible that BWC's operations included treating wood in pressurized cylinders and likely involved the use of other preservatives, such as petroleum-based or phenolic compounds. Sewer tie-ins from the Facility were the likely transport mechanism for creosote residuals historically discharging from the Facility and into NRD and eventually into the LSR.

On September 4, 1946, the Ohio Department of Health (ODH) first cited BWC as a contributor of contamination to surface water. In a letter dated December 4, 1946, ODH informed BWC that it should install a waste treatment system. The waste treatment system was put into place in 1953. After the waste treatment system had been installed, ODH documented ongoing discharge of creosote material from the BWC property. Subsequent letters from ODH urged the company to cease any operations that affected the water quality in the LSR. Use of the property for creosoting operations stopped sometime in the 1960s.

From 1970 until the early 1990s, the eastern portion of the BWC property was used by Sims Brothers, Inc. (Sims) as a scrap metal salvage yard for railroad tank and boxcars. Sims purchased the property from D.B. Frampton Company, and Sims later formed the Baker Wood Limited Partnership, which became the owner of the property. It is not known what type of practices occurred during the salvage operations. The site has been vacant since the early 1990s.

3. Previous Investigations & Removal Actions

In October 1991, Ohio EPA's Site Investigation Field Unit conducted an investigation at the BWC Site. The purpose of this investigation was to collect field data necessary to establish the presence of hazardous constituents at the BWC Site that had been migrating or continued to migrate off-site and to sensitive receptors. The investigation concluded that PAHs were present in soils at the BWC Site. However, the investigation was inconclusive as to determining whether contamination from the BWC site discharged to the LSR.

On March 20, 1992, ODH issued an advisory against swimming in, wading in, and eating fish caught from a 4-mile length of the LSR, from Holland Road south to State Route 739. The Ohio sport fish consumption advisory recommended not consuming any fish from this stretch of the LSR because of the PAH contamination found at the BWC Site.

In 1996, Ohio EPA performed an integrated assessment (IA) at the BWC Site. Ohio EPA sampled and analyzed the water in the combined sewer, as well as the sediment in NRD. Analytical data confirmed the presence of VOCs and PAHs associated with former creosoting operations that were also present in the NRD and LSR. According to Ohio EPA's IA report, extremely high levels of VOCs and PAHs were detected in waste buried or partially buried at the BWC Site (Ohio EPA 2006).

On December 2, 1998, Ohio EPA staff met representatives from the EPA Technical Support Unit and Ohio State University at the Site to conduct a site reconnaissance for a proposed geophysical survey. Previously, ODH had identified BWC as a contributor to the contamination in NRD and LSR. The purpose of the geophysical survey was to delineate the extent of contamination at the BWC property. The proposed geophysical survey area, approximately 250 feet by 1,500 feet, included the former processing area. On January 21, 1999, EPA set up a grid and used a ground-penetrating radar (GPR) unit and an electromagnetic (EM) survey unit. The former processing area was surveyed using a grid (100 feet by 300 feet) with a line spacing of 3 feet. The results of the GRP and EM survey indicated that most of the contamination was present in the former process area.

In April 1999, EPA initiated a time-critical removal action at OU2. Initial test trenches were excavated to delineate the extent of contamination. Approximately 2,742 cubic yards (3,565 tons) of creosote-contaminated soil was excavated from the former processing area and disposed of off-site at EQ Wayne Disposal located in Belleville, Michigan. EPA removed the contaminated material from OU2 to mitigate further migration of contaminants to NRD and LSR. During removal activities, EPA removed several creosote-contaminated drainage tiles and sewer tie-ins from beneath the BWC property to prevent further migration of contaminants to the sewer and subsequently to NRD. EPA backfilled the excavated areas with clean soil, graded, and seeded to restore site vegetation.

From May 17, 1999, to May 20, 1999, the EPA conducted additional test excavations to determine the extent of contamination remaining on the Site. During trenching, EPA identified four additional areas of contamination. The four areas revealed creosote waste and heavily contaminated soils, primarily east and northeast of the former processing area. EPA excavated and staged approximately 3,000 tons of additional waste and contaminated soil. Land disposal restrictions (LDR) instituted on May 12, 1999, mandated that listed creosote wastes could no longer be placed in any type of landfill unless they met LDR limits. This restriction applied to the EPA removal actions that were under way at the time. Therefore, contaminated sediments concurrently being removed from NRD and LSR, as well as contaminated soils from BWC Facility, were staged on site in windrows for bioremediation. The windrows were treated with nutrients to accelerate the biological degradation of the contaminants. EPA performed periodic sampling of the windrowed soils. From January 2000 to June 2001, total average PAH concentration dropped from approximately 15,000 parts per million (ppm) to 2,000 ppm. The sampling revealed the process was effective in significantly reducing PAH concentrations in the soil. Accordingly, EPA decided to construct a treatment cell for the continued bioremediation of these soils. On September 27, 2001, EPA demobilized from the Site.

In November 1999, before the treatment cell had been completed, EPA installed five groundwater monitoring wells screened in the shallow unconsolidated aquifer. The presence of shallow bedrock across the Site indicated that creosote contaminants had the potential to find a pathway to groundwater flowing in the lower, limestone aquifer. Because of this possible migration route, four additional groundwater monitoring wells were installed in September 2002 and screened deeper in the upper portion of the limestone bedrock. The deeper monitoring wells were installed on both the east and west sides of the bioremediation area, as well as the western portion and the northeastern corner of the Site.

In October 2002, Ohio EPA conducted an expanded Site inspection. Ohio EPA field personnel collected 20 samples from on-site soils and groundwater. Soil samples collected east of the former processing area appeared to be significantly contaminated by Site operations, especially at depths of 0- to 2-feet below ground surface (bgs). Ohio EPA detected numerous SVOCs and metals in soil samples collected at shallow and deep intervals. Two of the shallow monitoring wells contained detectable concentrations of VOCs and SVOCs. No VOCs were detected in the deep monitoring wells. Low concentrations of metals were detected but not at concentrations exceeding drinking water standards. The investigation concluded that the discharge from the BWC Facility to the sewer was no longer a threat; however, the groundwater pathway was still a concern in 2003 because at that time the City of Marion obtained its drinking water from the LSR and Scioto River and from groundwater wells in the area (Ohio EPA 2003).

In July 2003, EPA completed bioremediation and disposed of the bioremediated soils off site. The soils beneath the bioremediation area were not included in the surface and subsurface investigation conducted by the EPA removal program since active treatment was ongoing at that time. However, based on historical information, those soils were also believed to contain elevated concentrations of PAHs and possibly other contaminants.

4. Remedial Investigation

After the Site was listed on the NPL in 2009, EPA initiated an investigation to identify potentially responsible parties (PRPs) capable of leading the RI. EPA was unable to identify any liable and viable PRPs to conduct the RI and initiated a federally funded RI from 2011 to 2013. The RI activities, data collection methodologies, resulting data, physical characteristics of the Site, nature and extent of contamination, contaminant fate and transport, and conceptual site model (CSM) are documented in detail in the RI Report and summarized in Section C of this Proposed Plan.

A human health risk assessment (HHRA) and a screening-level ecological risk assessment (SLERA) were also completed as part of the RI. The HHRA and SLERA are presented as Appendix E in the RI report and summarized in Section E.

5. Community Involvement

EPA conducted community interviews in 2009 to better understand the community and its needs regarding the Site. These interviews were conducted with residents and local officials. EPA completed a community involvement plan for the Site in November 2009. (https://semspub.epa.gov/work/05/920106.pdf).

C. SITE CHARACTERISTICS

1. OU2 Setting

The OU2 occupies about 60 acres of historically industrial and wooded areas. The western portion of OU2 is a predominantly wooded area. It operated as a lumber preserver from the 1890s until the 1960s. Lumber, including railroad ties, was preserved with coal tar creosote, petroleum, and other solvents in pressurized tanks. The lumber was then stacked to dry on the western portion of the BWC property. Former railroad lines can be found throughout the OU2. The area formerly referred to as the railroad tie yard or drip yard, where raw and finished wood products were stored, covered the majority of the OU2's western portion, and has become overgrown with dense woodland.

Evidence of the old creosoting operation still exists. The foundations of many of the old buildings are still evident, and one metal building still exists in the northeastern part of OU2. Only a portion of the Site is secured with fencing, erected during EPA's removal activities. The Site is within an area subject to minimal flooding but is not in a mapped flood zone (Ohio EPA 2003).

2. Demographics and Land Use

The approximate population of Marion County, based on 2010 census data, is 66,501 (U.S. Census Bureau 2010). Agriculture accounts for roughly 86 percent of the land usage in Marion County. Row crops are the primary agricultural land usage. Woodlands, industry, and residential are the other major land uses in the county. The City of Marion is the largest community and the county seat. The approximate population of the City of Marion, based on the 2010 census, is 36,837. Median income based on 2015-2019 census data is $38,221.

The Site is located west of the City of Marion. The Site is bounded to the north and west by agricultural fields, to the east by Harding Highway and low-density residential properties, and to the south by Holland Road. South of Holland Road is property occupied by Union Tank Car Company and a Whirlpool shipping facility. The Site is currently vacant with no on-site workers. The general land use within one mile of the Site is residential and commercial to the north and east, industrial to the south, and agricultural to the west (Ohio EPA 2003).

The OU2 is currently zoned for industrial use by the City of Marion, which is consistent with Marion County's future land use plan. The Site is within the local water and wastewater utility area with services provided by Aqua America [formerly the Ohio American Water Company (OAWC)].

Therefore, if the Site is redeveloped in the future, it is unlikely that drinking water wells or septic systems would be permitted for use due to the availability of public utilities. Water wells and septic systems would need to be approved by the City Council followed by a permit by the Board of Health. The area water utilities utilize groundwater for potable use; as such, the utilities have groundwater protection zones associated with their well fields. The Site is outside the City of Marion OAWC Inner Management Zone (IMZ) but inside the Source Protection Area. The IMZ is the area that provides groundwater to OAWC-Marion's wells within one-year travel time of pumping. A chemical spill in this zone poses a greater threat to the drinking water, so this area warrants more stringent protection. The Source Protection Area is the additional area that contributes water when the wells are within a five-year groundwater travel time under active pumping. Together, they comprise the drinking water source protection area (Marion Land Use Plan 2011). As a result, OU2 is located within a groundwater protection area and groundwater should be considered a potable resource.

3. Ecological Habitat

OU2 is currently covered with a mix of secondary tree growth and scrub plant growth. The western two-thirds of OU2 is covered with thick tree growth. Large portions of unvegetated soils exist where significant concentrations of contaminants were detected.

4. Climate

Marion, Ohio is located in the temperate region of the United States with seasonal variations throughout the year. The average daily temperature plot depicts a bell curve, with the hottest days in July and the coldest days in January. The mean monthly temperature in Marion varies from approximately 17°F in January to 83°F in July. The mean annual precipitation is approximately 39.28 inches, and the mean annual snowfall is 22 inches.

5. Geology

Regional Geology

The topography for Marion County was evaluated using U.S. Geological Survey (USGS) 7-1/2-minute quadrangle maps and the Soil Survey of Marion County (Miller and Martin, 1989). Slopes of 0 to 2 percent were identified for almost all of the settings in Marion County based on the overall flat lying to gently rolling topography and low relief. Slopes of 2 to 6 percent were assigned to most end moraines exhibiting hummocky terrain. Slopes of 6 to 12 percent were selected for a limited number of areas where the Scioto River or Olentangy River have steeply down cut the surrounding end moraine or ground moraine in southern Marion County. The glacial deposits in Marion County are the result of several episodes of ice advance that occurred in northwestern Ohio. The majority of the glacial deposits in Marion County fall into four main types: (glacial) till, outwash (valley train) deposits, and ice-contact sand and gravel (kames and eskers) deposits, and lacustrine deposits (ODNR 2003).

Bedrock underlying the surface of Marion County belongs to the Silurian, Devonian, and Mississippian Systems. Carbonate (limestone and dolomite) bedrock underlies the western and central portions of Marion County. Based on a state geological map, the bedrock in Marion appears to be of Devonian age. A review of the well logs in the vicinity of the area compiled by the Ohio EPA indicates that the geology of Marion County consists primarily of fractured limestone deposits with a thin, clayey overburden (Ohio EPA 2008). The well logs also indicate bedrock within a 4-mile radius ranging from

14 feet bgs to 57 feet bgs. The depth to bedrock ranges from approximately 5 feet near the former BWC site to greater than 80 feet 3 miles west of the site.

Site-Specific Geology

Surficial geology at the BWC site, based on USDA Web Soil Survey (USDA 2012), consists of Pewamo Urban land complex and Blount-Urban land complex. A typical profile for the Pewamo-Urban land complex is a silty clay loam to 53 inches and a clay loam from 53 inches to 60 inches. A typical profile for the Blount-Urban land complex is a silt loam to 10 inches and clay loam from 10 to 60 inches. Surficial soils at OU2 have been disturbed and reworked by past operations, previous removal actions conducted by EPA, and construction and dismantling of the bioremediation during the 1999 removal action. In addition, a slag pile is present east of the former bioremediation area, and slag is present throughout the site at or near the ground surface.

Unconsolidated materials encountered during drilling at OU2 included several distinct types of materials with a total thickness ranging from about 10 to 20 feet. The uppermost unconsolidated materials encountered during drilling generally consist of topsoil, sand, gravel, slag, or a combination of these. These materials are underlain by slag, fill, or in some places black silty clay. The fill material is typically underlain by brown mottled silty clay, sometimes containing small amounts of sand and gravel. The brown silty clay is typically underlain by gray stiff to soft silty clay containing varying amounts of sand and gravel. The gray silty clay is typically underlain by weathered, fractured limestone bedrock. Sand is present between the brown and gray silty clays at some locations and sand and gravel were present between the gray silty clay and the limestone bedrock at some locations.

The depth to bedrock at OU2 ranges from about 10 feet bgs to about 20 feet bgs based on probe refusal or bedrock encountered in the actual sampling device during the soil and groundwater investigation. In general, bedrock slopes downward from east to west. The elevation changes about 13 feet from the easternmost boring (BWC-01, elevation 921.2 msl) to the westernmost boring (BWC-46, elevation 907.98 msl). However, the bedrock surface is not smooth and contains localized high areas and depressions. Groundwater present in the unconsolidated sand seams and in the weathered bedrock at the unconsolidated material/bedrock interface is referred to as shallow groundwater. Groundwater present in the fractured competent limestone bedrock is referred to as deep groundwater. Shallow and deep groundwater flow direction was confirmed to generally be in the westerly direction.

6. Remedial Investigation Results

EPA conducted the RI between July 2009 and August 2013 using a phased approach. The significant findings and conclusions from the site characterization activities completed during the RI are summarized below. The August 2013 Final RI Report provides additional detail about investigations and can be found at: www.epa.gov/littlesciotoriver.

Groundwater

EPA sampled groundwater in 18 different temporary well locations throughout both exposure areas. Analytes benzo(a)pyrene, benzo(b)fluoranthene, dibenzofuran, naphthalene, aluminum, arsenic, cobalt, iron, lead, and manganese were detected in groundwater samples at concentrations exceeding one or more screening levels and background concentrations where available. Four SVOCs (benzo[a]pyrene, benzo[b]fluoranthene, dibenzofuran, and naphthalene) were detected at concentrations exceeding the regional screening levels (RSLs). RSLs were identified as Safe Drinking Water Act (SDWA) MCLs. Six inorganic compounds (aluminum, arsenic, cobalt, iron, lead, and manganese) were detected at concentrations exceeding the human health screening levels (HHSLs); however, once background values were taken into consideration, only the following metals exceeded both the RSL for tap water and established background range: aluminum in temporary monitoring well BWC-GW51, cobalt in temporary monitoring wells BWC-GW36A and BWC-GW51, iron in temporary monitoring wells BWC-GW36A and BWC-GW51, and manganese in temporary monitoring well BWC-GW51. Groundwater contamination at the Site is primarily located in BWC-E near the former bioremediation area. The estimated extent of groundwater contamination is shown in Figure 3a (Appendix C).

Surface & Subsurface Soil

EPA performed soil sampling at 35 locations at various depths as well as 71 Laser Induced Fluoroscopy (LIF) borings. Surface soils are defined as the top 2-4ft bgs and subsurface soils are defined as the soils from 4ft bgs to the bedrock which is generally 10-20ft bgs. No VOC contamination was detected in either exposure areas. Seventeen SVOCs, including PAHs, were detected at concentrations exceeding screening levels. SVOC and PAH contamination in surface soils is greatest near the former bioremediation area and extends east to the property boundary to include the waste slag pile, south toward Holland Road, and approximately 500 feet west of the former bioremediation area. SVOCs were detected in most surface soil samples and exceeded RSLs throughout the eastern part of OU2, with the highest concentrations being within and directly east of the former bioremediation and at sample location BWC-30. Arsenic is present throughout OU2 at concentrations exceeding the commercial/industrial RSLs for both surface and subsurface soils. The estimated extent of surface and subsurface soil contamination is shown in figures 3b and 3c (Appendix C).

Non-Aqueous Phase Liquid

EPA performed LIF borings at 71 different locations throughout both exposure areas at OU2 to determine the extent of the non-aqueous phase liquid or "free product." Based on LIF screening results, locations BWC-07A, BWC-07B, BWC-07C, BWC-08, BWC-08A, BWC-10A, BWC-31, and BWC-36A all presented with wavelength frequencies indicating the presence of product at the bedrock interface (average depth to bedrock is 14 ft bgs). Even though field observations during water level measurements may not have indicated the presence of product or odors, based on analytical results, all eight of these locations in this exposure area had elevated concentrations of SVOCs in soils. In addition, the groundwater sample collected from BWC-GW07A indicated elevated concentrations of SVOCs, which is in line with the LIF screening results. In addition, although BWC-GW36A did not show elevated concentration of SVOCs in the analytical results, the LIF screening results further corroborate the presence of both light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) at this well. BWC-GW31 also indicated the presence of DNAPL based on LIF screening results. This well contained elevated concentrations of SVOCs in soils, indicating that although LNAPL may not be present, there could be DNAPL at the bedrock.

Principal Threat Waste

NAPL present at OU2 is considered a principal threat waste. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. This includes liquids such as free product (NAPLs) that contain chemicals of concern. Highly mobile wastes such as liquids can be difficult to contain, therefore remedial alternatives in subsurface soils and groundwater will focus on treatment of the NAPL on-site, rather than containment.

Conceptual Site Model

Based on information obtained during the RI, the following CSM is proposed for OU2. Data used to generate the CSM includes Site historical information, data acquired during various historical investigations, and data acquired during both phases of the RI. Figure 4 (Appendix D) illustrates a generalized conceptual model of the Site.

OU2's CSM is a schematic representation that illustrates important features of the Site that resulted in the contamination problem the RI/FS is intended to address. The CSM consists of three general components: contaminant source, contaminant transport mechanisms, and receptors.

<u>Sources</u>

Primary Contaminant Source

- The primary source of contamination at OU2 includes spills, leaks, waste, or other releases resulting from past wood treating operations. Contaminants detected during the RI and previous investigations include elevated levels of PAHs, VOCs, and metals.

<u>Transport Mechanisms</u>

Five main transport mechanisms have been identified:

- Volatilization
- Fugitive Emissions
- Runoff
- Erosion
- Leaching by percolation

The primary affected media include: (1) groundwater, (2) surface and subsurface soils, and (3) ambient air. Migration through groundwater is a potential pathway at the Site and is thought to be the primary migration pathway of concern. VOCs are soluble and mobile and would be expected to migrate downgradient, most likely in a dissolved phase. SVOCs are considered less mobile and soluble based on their higher molecular weights and the fact that they are more likely to adsorb to the soils; however, they still have the potential to migrate through the subsurface to groundwater. PAHs have low solubilities and are less likely to migrate in groundwater.

Contaminants released to surface and near surface soil would be expected to volatilize to the atmosphere. Contaminants in subsurface soil would be expected to sorb to soil and leach to groundwater over time through precipitation and downward percolation. Elevated concentrations of PAHs and metals were detected in the unsaturated soils above the water table throughout the Site, but especially within and directly north and east of the former bioremediation area. Initial surface releases could result in infiltration or leaching through the soils as the constituents move downward toward the water table. The PAHs and SVOCs detected in the saturated soils will generally adsorb to the soil and have limited mobility in the saturated zone.

Fugitive emissions in air may be deposited from air to surface soil. VOCs detected in groundwater have the potential to migrate into the air via groundwater or through LNAPL. Both benzene and ethylbenzene would readily volatilize from groundwater based on their high Henry's Law constants. SVOCs are less volatile but still have the potential to release to air via groundwater. PAHs and metals do not significantly volatilize; however, they can be adsorbed to soil and dust particles and therefore could be released to the air by wind.

<u>Receptors & Exposure Routes</u>

The area surrounding the Site is largely commercial/industrial, agricultural, with limited residential. Potential human and ecological receptors are discussed below.

- **Current and Future Trespasser:** Current and future trespassers were assumed to be exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface soil and subsurface soil throughout OU2.
- **Future Commercial/Industrial Worker:** Future commercial/industrial workers were assumed to be exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil and via ingestion of groundwater used as a source of potable water and via inhalation of vapors migrating from groundwater to indoor air. This exposure assumes commercial/industrial workers are exposed to the average area concentration during work activity.
- **Future Construction Worker:** Future construction workers were assumed to be exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil and via inhalation of VOCs and naphthalene fromOU2. (Note: The water table at OU2 is at 8 to 10 feet bgs, which is close to the typical depth of construction trenches. Therefore, it is assumed that groundwater could enter construction trenches and construction workers could have direct contact with groundwater). This exposure assumes future construction workers are exposed to a point source concentration during work.
- **Current and Future Farmer/Resident**: The land immediately north and west of the Site is currently farmed with one residential property served by a private drinking water well located approximately 2,800 feet west of the former bioremediation area and 500 feet west of the western site boundary. Contaminated groundwater exceeding the MCL or tap water limits could potentially migrate off-site to the farm resident's well.
- **Future Utility Worker:** Future utility workers were assumed to be exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil and via inhalation of VOCs from site (Note: The water table at OU2 is at 8 to 10 feet bgs, which is close to the typical depth of utility trenches.

Therefore, groundwater was assumed to enter utility trenches and utility workers were assumed to have direct contact with groundwater.)

Ecological receptors are unlikely because the BWC property is an isolated habitat that is surrounded by agricultural fields on three sides and an industrial operation to the other side.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As explained above, the Site has been divided into two operable units. OU 1 includes the contaminated stretch of Little Scioto River. OU 2 includes the BWC Facility.

This Proposed Plan presents information about the potential exposures from OU2 and presents EPA's Preferred Alternative to address surface soil, subsurface soil, and groundwater contamination.

E. SUMMARY OF SITE RISKS

As part of the RI/FS, EPA conducted a HHRA and SLERA to determine the current and future risks to human health and the environment from contaminants at the Site. To conduct these risk assessments, EPA assumed that the current land use at the Site will remain the same in the future, which consists of mostly industrial and small commercial operations. EPA also assumed that properties at the Site will continue to have access to municipal water. EPA issued both risk assessments in August 2013 as appendices to the RI report.

1. Human Health Risks

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a Site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies of the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help EPA determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" scenario which portrays the highest level of human exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability – for example, a "1 in 10,000 chance" – and is described in terms of an excess lifetime cancer risk (ELCR). For example, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected from all other causes. For non-cancer health effects, EPA calculates a "hazard index" (HI). The key concept here is that a "threshold level" (measured usually as an HI of less than 1) exists below which non-cancer health effects are not predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are then combined, evaluated and summarized.

The RI sample results from the Site were evaluated in the HHRA to identify the COCs in the source materials and various media that pose a current and/or future potential unacceptable risk to human receptors. A contaminant was carried through the risk assessment as a COC if it posed an ELCR greater than EPA's acceptable risk range of $1x10^{-4}$ (1 in 10,000 chance) to $1x10^{-6}$ (1 in 1,000,000 chance) for cancer risks or exceeded an HI of 1 for non-cancer risks and was above background.

<u>Contaminants of Potential Concern</u>

In the HHRA, EPA evaluated the potential COCs in surface soil, subsurface soil, and groundwater. Total risks exceed 1E-04, the upper end of EPA's target risk range for future residents, child recreationalists (surface soil only), future industrial/commercial workers, future construction workers, and future utility workers at BWC-E and for future residents (BWC-W). Soil risks are primarily driven by potential exposure to BaPE[1] and to a lesser extent arsenic. Soil hazards exceed 1 only for residents (BWC-E and BWC-W). These hazards are driven by various metals including arsenic, cadmium, cobalt, copper, iron, and manganese, as wells as several PAHs (BWC-E only).

Groundwater risks for residents and industrial/commercial workers are driven by potential exposure to BaPE, and to a lesser extent, arsenic and 1-methylnaphthalene. At BWC-E the following organics also contributed to groundwater risks: 1,1'-biphenyl, ethyl benzene, and benzene. Groundwater risks for construction workers and utility workers at BWC-E are driven by potential exposure to naphthalene (via inhalation of vapors in a trench), and to a lesser extent, the same groundwater COPCs described in the preceding bullet. Groundwater risks for these same receptors are negligible at BWC-W.

<u>Ecological Risk</u>

[1] BaPE is a representation of the seven carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,b)anthracene, and indeno(1,2,3-c,d)pyrene)

The results from the SLERA for OU2 clearly show that portions of OU2 have elevated concentrations of metals, pesticides, and PAHs that may pose potentially unacceptable risks to ecological receptors. The former main plant area is the portion that showed the highest risk. However, this area is of limited ecological significance because it is an isolated habitat that is surrounded by agricultural fields on three sides and an industrial operation to the other side. Based on this information, a BERA is not recommended forOU2.

<u>Basis for Action</u>

EPA concludes that the Preferred Alternative identified in this Proposed Plan, or one of the active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

F. REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are goals specific to media for protecting human health and the environment. They are based on unacceptable risks, anticipated current and future land use, objectives and expectations of the action, and statutory requirements.

EPA developed RAOs for both the soils and groundwater at OU2. The RAOs specific to this proposed action are as follows:

Soil RAOs

- Prevent direct contact with, inhalation of, or ingestion of surface soils at concentrations that exceed human health ECRs for commercial/industrial workers, construction workers, and utility workers.
- Prevent direct contact with, inhalation of, or ingestion of subsurface soils at concentrations that exceed human health ECRs for construction workers and utility workers.
- Reduce soil-to-groundwater concentrations of COCs to levels that are protective of groundwater and allow for cleanup of groundwater to federal and state drinking water standards.

Groundwater RAOs

- Prevent direct contact with, inhalation of, or incidental ingestion of groundwater contaminated by unacceptably high concentrations of contaminants of concern for construction or utility workers.
- Restore onsite groundwater to its beneficial use by achieving the federal and state drinking water standards for contaminants of concern.
- Prevent direct contact and inhalation of NAPL source material by future site workers or construction workers.

Soil Preliminary Remediation Goals (PRGs)

Contaminants of Concern detected in soils at the BWC site include:

- Benzo(a)Pyrene
- Benzo(a)Pyrene Equivalent

- Naphthalene
- Dibenzofuran
- Ethylbenzene
- Benzene
- Arsenic

Based on the HHRA, arsenic, benzene, BaPE, BaPEq, ethylbenzene, and napthalene were risk drivers and therefore determined to be COCs in soil. Additionally, pesticide compounds were present at low concentrations and within the area encompassed by the above contaminants and were not used as part of the prior site operations. Thus, PRGs were not developed for pesticide compounds in soil. Three COCs, BaPE, naphthalene, and arsenic, are a concern in the surface soil for commercial/industrial workers, construction workers, and utility workers. The same three COCs also exceed the HHSL for construction and utility workers. These three COCs, along with the other identified soil COCs, present a potential for soil to groundwater contamination above the MCL or tap water RSL for off-site farmer or residential receptors. Table 3 shows screening levels and PRGS for soils.

Table 3: Screening Levels and PRGs for Soils

Chemical of Concern (COC)	Commercial/ Industrial Worker	Construction or Utility Worker	Soil to Groundwater (MCL Screening)	Soil PRG
Arsenic	26.8	119	0.292	0.292
Benzene	---	---	0.0026	0.0026
Benzo(a)pyrene (equivalent)	17.1	172	---	17.1
Benzo(a)pyrene	---	---	0.24	0.24
1,1'-Biphenyl	---	---	---	---
Dibenzofuran	---	---	---	---
Ethylbenzene	---	---	0.79	0.79
1-Methhylnapthalene	---	---	---	---
2-Methhylnapthalene	---	---	---	---
Napthalene	155	16.3	16.3	16.3

Notes:

- All concentrations in mg/kg.
- Values for commercial, industrial, construction, or utility workers based on 1E-05 cancer risk and Noncancer Hazard for Soils and are from site-specific risk assessment (SulTRAC, 2013).

Groundwater PRGs

Contaminants detected in groundwater at OU2 include carcinogenic PAHs, metals, VOCs, and SVOCs. The primary drivers of risk in groundwater are BaPE, naphthalene, arsenic, benzene, ethylbenzene, 1-methylnaphthalene, 2- methylnaphthalene, 1, 1'-biphenyl, and dibenzofuran.

Groundwater contamination is primarily present in the vicinity of the former bioremediation area but extends westward in the direction of the shallow groundwater flow along the southern boundary of OU2 parallel to the NRD. Table 4 shows screening levels and PRGs proposed for OU2's groundwater.

Table 4: Screening Levels and PRGs for Groundwater

Chemical of Concern (COC)	Commercial/ Industrial Worker	Construction or Utility Worker	Groundwater MCL or Tap Water RSL	Groundwater PRG
Arsenic	9.4	2995	10	10
Benzene	47.3	26.7	5	5
Benzo(a)pyrene (equivalent)	2.6	2.3	---	2.3
Benzo(a)pyrene	---	---	0.2	0.2
1,1'-Biphenyl	327	0.59	0.83	0.83
Dibenzofuran	93.4	59.9	5.8	5.8
Ethylbenzene	236	149.3	700	149.3
1-Methhylnapthalene	90.2	1586	0.97	0.97
2-Methhylnapthalene	---	---	27	27
Napthalene	155	16.3	16.3	16.3

Notes:

- All concentrations in µg/L.
- Values for commercial, industrial, construction, or utility workers based on 1E-05 cancer risk and Noncancer Hazard for Groundwater and are from site-specific risk assessment (SulTRAC, 2013).

G. SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives for OU2 are presented below. The alternatives are numbered to correspond with the numbers in the FS report and are further explained in the FS report.

Capital costs are those expenditures that are required to construct a remedial alternative. Operation and maintenance (O&M) costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis. The "present worth" cost is the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project. The present worth costs for the remedial alternatives below were calculated using a discount rate of seven percent and a 30-year time interval to estimate long-term O&M costs. Construction time is the time required to construct and implement the alternative and does not include the time required to design the remedy or procure contracts for design and construction.

A summary of the cleanup alternatives for which EPA conducted a detailed analysis to consider for this response action is provided below.

Description of Remedial Alternatives

Common Elements

All the remedial alternatives evaluated in the FS, except the no action alternative, include the following common elements:

- Institutional Controls (ICs) to prohibit the potable use of groundwater until RAOs are achieved within the contaminated groundwater plume.
- Institutional and engineering controls (such as signs, fencing, etc.) necessary to protect public safety during construction and, if applicable, operation of the remedy. Additional ICs and engineering controls will be included, as applicable, to protect components of the remedy (such as force mains moving contaminated groundwater). The specific controls will be engineered during the design phase.
- A pre-design investigation with the objective of better characterizing the source area(s) to provide information necessary for design. This investigation is anticipated to include soil and groundwater sampling, monitoring well (MW) installation and sampling, and analyses.
- Installation of a monitoring network for the long-term monitoring of the plume.
- A 25% contingency is added to the capital and operations and maintenance (O&M) costs to estimate total costs.

Table 5: BWC Site Remedial Alternatives

Media	Alternative Number	Alternative Title
Surface Soil	1	No Action
	2	Asphalt Soil Capping
	3	Surface Soil Excavation and On-site Consolidation
	4	Excavation and Disposal Off-Site
Subsurface Soil	1	No Action
	2	Excavation and Off-site Disposal
	3	Thermal Conduction Heating
	4	In Situ Stabilization and Chemical Oxidation with Sodium Persulfate and Lime
Groundwater	1	No Action
	2	Monitored Natural Attenuation (MNA)
	3	Enhanced Biodegradation
	4	Extraction and Treatment

Surface Soil Alternatives

Surface Soils Alternative 1—*No Action*

EPA is required to evaluate a "no-action" alternative when considering potential remedial actions for a site to provide a baseline for comparison to the other potential response actions. The no-action alternative means that no remedial action would be undertaken and that no ICs, containment, removal, treatment, or other mitigating actions would be implemented to control exposure to COCs. The No Action alternative provides a reference to evaluate other alternatives. Under Surface Soil Alternative 1, no action would be taken to remediate soils at OU2. Under the No Action alternative, no soil would be excavated, capped or treated.

Estimated Costs for Alternative 1

Direct Capital Costs:	$0
30-year O&M Costs:	$0
Total Estimated Costs:	$0

Surface Soil Alternative 2— *Asphalt Soil Cap*

This alternative involves construction of an asphalt soil cap over surface soils with unacceptable risks. The slag pile, which is below the PRGs for soil, could be graded over the area prior to capping, or relocated outside the area. Coarse aggregate, prime coat of bituminous material, and asphaltic concrete surface material would be placed entirely over the surface area to eliminate exposure to the surface soils. For cost estimation purposes, 10 inches of coarse aggregate and two inches of asphaltic concrete surface material would be used for the cap. This conforms to the design requirements for blacktop alleyways and driveways in the Marion City Code Section 901. The asphalt cap could be incorporated into the site redevelopment plan and used as parking or building foundation. The final design would eliminate direct contact with soils while also meeting Marion City Code requirements.

Estimated Costs for Alternative 2:

Direct Capital Costs:	$959,000
30-year O&M Costs:	$380,000
Total Estimated Costs:	$1.67 Million

Surface Soil Alternative 3 – *Excavation and On-site Consolidation*

This alternative excavates all or part of the surface soils, consolidates the material on-site, and covers the consolidated soils with a cap consisting of two feet of clay and one foot of topsoil. All of the surface soil exceeding the 1.0E-05 ECR level, as well as the slag pile, would the excavated and relocated to the eastern end of OU2. The surface soils would be formed into a trapezoidal berm approximately 1,100 feet long, 100 feet wide at the bottom, 50 feet wide at the top, and 10 feet high. The final height with the soil cap would be 13 feet high. This berm could be incorporated into the site redevelopment plan to provide a visual buffer between the commercial or industrial development on the site and the existing residential homes east of the property. The surface soil excavation area would be restored with 18 inches of clean backfill and six inches topsoil and then seeded.

Estimated Costs for Alternative 3:

Direct Capital Costs:	$1,789,000
30-year O&M Costs:	$324,000
Total Estimated Costs:	$2.64 Million

Surface Soil Alternative 4 – *Excavation and Off-site disposal*

Alternative 4 consists of excavating two feet of soil over 131,909 SF of OU2, as well as the slag pile which lies over this area and disposing of the 11,771 bank cubic yards (BCY) of soil at a Subtitle D facility. This alternative would excavate all surface soils exceeding the 10E-05 risk level and the slag pile, load the soils on trucks, and transport the soil to a local landfill licensed to accept the material. The surface soil excavation area would be restored with 18 inches of clean backfill and six inches topsoil and then seeded.

Estimated Costs for Alternative 4:

Direct Capital Costs:	$2,606,000
30-year O&M Costs:	$47,000
Total Estimated Costs:	$3.32 Million

<u>Subsurface Soil Alternatives</u>

Subsurface Soils Alternative 1—*No Action*

Under Subsurface Soils Alternative 1, no action would be taken to remediate contaminated soil. If no action occurred at OU2, the subsurface soil would be left “as is” without implementing access controls, containment, removal, treatment, or other mitigating actions.

Estimated Costs for Alternative 1

Direct Capital Costs:	$0
30-year O&M Costs:	$0
Total Estimated Costs:	$0

Subsurface Soils Alternative 2—*Excavation & Off-site Disposal*

Subsurface Soils Alternative 2 consists of excavation of approximately 47,000 BCY of soil inside the source area at OU2. Subsurface soil contamination begins at 2ft bgs and extend to bedrock. The average depth to bedrock is 14ft bgs. Air monitoring and other site controls would be employed during excavation. Approximately 50 percent of the soil is below the water table and would require dewatering during excavation. Wet soil would need to be stockpiled to dry prior to off-site disposal. Landfarming or other on-site treatment may also be required to reduce soil COC concentrations to meet the landfill waste acceptance criteria. After soils are removed, the excavation would be filled with coarse aggregate to 2 feet below grade, covered with a nonwoven geotextile, followed by 18 inches of backfill and 6 inches of topsoil. The area would then be seeded and restored.

Estimated Costs for Alternative 2
Direct Capital Costs: $7,010,000
30-year O&M Costs: $47,000
Total Estimated Costs: $8.82 Million

Subsurface Soils Alternative 3—*Thermal Conduction Heating*

This alternative would require the installation of 405 heater borings into the subsurface soil source area. Subsurface soil contamination begins at 2ft bgs and extends to bedrock. The average depth to bedrock is 14ft bgs. The heating elements would heat the soil, as well as the groundwater, to approximately 220 degrees Fahrenheit. The high temperature would convert contaminants in the soil to either liquid or vapor, which would then be extracted using 131 dual-phase extraction wells. Vapors would be thermally treated above ground. A gravity separator would remove NAPL for the withdrawn liquids for off-site disposal. The remaining liquids would be treated using granular activated carbon to meet the City of Marion pretreatment requirements before discharge to the local sanitary sewer and final treatment at the local publicly owned treatment works (POTW). The treatment system area would be enclosed within a fence to prevent trespassers from interfering with the system.

Estimated Costs for Alternative 3
Direct Capital Costs: $ 6,910,000
30-year O&M Costs: $47,000
Total Estimated Costs: $8.70 Million

Subsurface Soils Alternative 4— *In Situ Stabilization and Chemical Oxidation with Sodium Persulfate and Lime*

This alternative uses a bucket or drum mixing to place sodium persulfate and lime in contact with the subsurface contaminants. Bucket mixing is where a standard backhoe or excavator bucket is used to mix in situ stabilization (ISS) reagents into the soil. Drum mixing involves a rotating drum mixing head that is typically attached to an excavator or backhoe arm. These drums also come with integrated dosing systems that allow ISS reagents to be injected at the point of mixing. Bucket and drum mixers can be used for mixing to depths of 12 to 15 feet. Subsurface soil contamination begins at 2ft bgs and extend to bedrock. The average depth to bedrock is 14ft bgs. The sodium persulfate and lime would be delivered to OU2 as solids. The solids would be converted to a slurry, pumped into the ground and mixed with the soil from the surface to the interface with the bedrock. Sodium persulfate, activated by lime, would oxidize the contaminants in the soil. Treatment of soils below the water table would also significantly reduce the groundwater contaminant concentrations. The mixing treats subsurface soil in the radius of the mixing tool. The process would be repeated in overlapped circles until the entire subsurface source area is treated resulting in organic compounds effectively destroyed and inorganic compounds stabilized reducing their mobility from soil to groundwater.

Estimated Costs for Alternative 4
Direct Capital Costs: $5,248,000
30-year O&M Costs: $47,000
Total Estimated Costs: $6.62 Million

Groundwater Remedial Alternatives

Groundwater Alternative 1—*No Action*

Under Groundwater Alternative 1, no action would be taken to remediate groundwater. If no action occurred at OU2, the groundwater would be left "as is" without implementation of access controls, containment, removal, treatment, or other mitigating actions.

Estimated Costs for Alternative 1

Direct Capital Costs:	$0
30-year O&M Costs:	$0
Total Estimated Costs:	$0

Groundwater Alternative 2—*Monitored Natural Attenuation*

This alternative would rely on land use controls to restrict the use of groundwater and drinking water at OU2 and would institute a monitoring program to evaluate the natural attenuation of the groundwater contamination. This alternative would allow for groundwater monitoring while site subsurface soils are being addressed. Additional groundwater monitoring wells would be installed onsite to evaluate groundwater concentrations over time. Groundwater monitoring results would be used to determine if concentrations were decreasing over time or if additional remedial actions are necessary. Purge water collected during sampling would require offsite disposal unless passive samplers were used. EPA has not yet collected lines of evidence to support MNA as a viable option to select as a final remedy for Groundwater at OU2.

Estimated Costs for Alternative 2

Direct Capital Costs:	$149,000
30-year O&M Costs:	$2,280,000
Total Estimated Costs:	$3.04 Million

Groundwater Alternative 3—*Enhanced Biodegradation*

This alternative would require injection of microorganisms, nutrients, and other additives into groundwater to enhance naturally occurring processes. The proposed injection area would be parallel to Holland Road along the north side of the road south of the former bioremediation area. The treatment area would be approximately 1,000 feet long and 25 feet wide. The 1,000-foot length covers the extent of the current free liquid. Assuming a 12-foot radius of influence for each injection point, points would be staggered within the treatment area. EPA anticipates approximately 200 injection points. The screening assumes that 15 pounds of degradation compound would be injected at each point in additional to water to create the slurry. After the injection, the reduction in groundwater concentrations would be monitored over time. If no remediation activities are taken to treat or remove subsurface soil contamination, additional rounds of injection may be necessary 2-5 years after the initial treatment.

Estimated Costs for Alternative 3

Direct Capital Costs:	$447,000
30-year O&M Costs:	$1,670,000
Total Estimated Costs:	$2.65 Million

Groundwater Alternative 4—*Extraction and Treatment of Groundwater*

This alternative would install shallow groundwater extraction wells in the same vicinity as the two previous groundwater alternatives. Groundwater would be withdrawn using four extraction wells, pumped through an on-site treatment system using a NAPL separator and granular activated carbon, and then discharged to the sanitary sewer for ultimate treatment at the POTW.

Estimated Costs for Alternative 4

Direct Capital Costs:	$932,000
30-year O&M Costs:	$3,700,000
Total Estimated Costs:	$5.79 Million

H. EVALUATION OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA articulates nine evaluation criteria for assessing remedial alternatives for sites that require remediation or mitigation. This evaluation promotes consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies that offer the most effective and efficient means of achieving site cleanup goals. While all nine criteria are important, they are weighed differently in the decision-making process depending on whether they evaluate protection of human health and the environment or compliance with federal and state requirements (threshold criteria), consider technical or economic merits (primary balancing criteria), or involve the evaluation of non-EPA reviewers that may influence an EPA decision (modifying criteria). To be selected, an alternative must meet the threshold criteria. The nine criteria are described below, followed by a discussion of how each alternative meets or does not meet each criterion.

Explanation of the Nine Evaluation Criteria

Threshold Criteria

1. ***Overall Protection of Human Health and the Environment*** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed by the Site are eliminated, reduced, or controlled through treatment, engineering, or institutional controls.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements*** addresses whether a remedy will meet all ARARs of federal and state environmental statutes and/or justifies a waiver.

Primary Balancing Criteria

3. ***Long-Term Effectiveness and Permanence*** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion also incorporates an evaluation of climate resilience.

4. ***Reduction of Toxicity, Mobility, or Volume through Treatment*** addresses the statutory preference for selecting remedial actions that employ treatment technologies that

permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as a principal element.

5. ***Short-Term Effectiveness*** addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction of the remedy until cleanup levels are achieved.

6. ***Implementability*** addresses the technical and administrative feasibility of a remedy from design through construction, including the availability of services and materials needed to implement a particular option, and coordination with other governmental entities.

7. ***Cost*** includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50 percent to -30 percent.

Modifying Criteria

8. ***State Agency Acceptance*** considers whether the state support agency concurs with, opposes, or has no comment on the Preferred Alternative presented in the Proposed Plan.

9. ***Community Acceptance*** considers whether the public agrees with EPA's analyses of the Preferred Alternative described in the Proposed Plan.

Comparison of Alternatives

In this section, the remedial alternatives are compared to each other in terms of how well they meet the specified evaluation criteria. Threshold and primary balancing criteria are presented and evaluated for each remedial alternative. The two modifying criteria, state and community acceptance, are briefly addressed below and will be further evaluated after this proposed plan undergoes public comment, then addressed in the Record of Decision.

1. *Overall Protection of Human Health and the Environment*

EPA is required to select remedies that will protect human health and the environment. All of the retained alternatives – with the exception of each media's "No Action" alternative – would protect human health and the environment. Because the "No Action" alternatives would not protect human health and the environment, EPA eliminated the "No Action" alternatives from consideration and will not discuss this alternative further in this Proposed Plan. For all remaining alternatives, all of the RAOs would be achieved upon successful treatment of the contaminated soils and the groundwater plume. The discussion below summarizes how the remaining alternatives for each media would achieve protectiveness.

Immediate risk reduction is provided by all the retained alternatives, except the No Action alternatives. In the short-term, ICs would be used to ensure that potable use of groundwater continues to be prohibited until RAOs are achieved. In the long-term, protection of human health will be achieved once soil and groundwater PRGs are met throughout OU2.

2. *Compliance with ARARs*

Section 121(d) of CERCLA and NCP § 300.430(f)(l)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be applicable or relevant and appropriate.

Three types of ARARs are identified on a site-specific basis: chemical-, location-, and action-specific ARARs. Each type of ARAR is briefly described below.

Chemical-specific ARARs are health- and risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values and methodologies (such as promulgated standards and risk assessments, respectively) establish acceptable concentrations of a chemical contaminant that can remain in the environment.

Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because the site-specific location is of environmental importance.

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particularremedial activities selected to accomplish a remedy.

All the retained remedial alternatives comply with applicable ARARs. The primary ARARs to be met relate to reducing COC concentrations in soils and groundwater to below their PRGs and proper management and disposal of waste generated during the remedial action. ARARs for this Site are summarized in Appendix E. Specific ARARs include:

- Federal ARARs
    - Resource Conservation and Recovery Act (RCRA)
    - Clean Water Act (CWA)
    - Safe Drinking Water Act (SDWA)
- State ARARs
    - Ohio Regional Code (ORC), Chapter 6111
    - ORC, Chapter 3754
    - ORC, Chapter 1501

3. *Long-term Effectiveness and Permanence*

All the retained remedial alternatives evaluated for OU2 are considered proven and effective methods for addressing the COCs at OU2.

Surface Soils

Alternative 4 has the best long-term effectives and permanence since all surface soil that must be addressed to meet the RAOs is removed and placed in a licensed landfill with no on-site long-term O&M requirements. Alternative 2 and Alternative 3 are also effective in the long-term for as long as the caps overlying the contaminated soil are maintained. These alternatives are potentially reversible as caps could be impacted, but regular maintenance and inspection would ensure effectiveness of capping. Although OU2 is in an area that is vulnerable to increased risk from tornadoes, severe thunderstorms, and flooding, none of the retained alternatives would be impacted by increased incidence of severe weather.

Subsurface Soils

Alternative 2 would be effective in the long-term because subsurface soil exceeding unacceptable risk levels for construction and utility workers would be removed and replaced with clean backfill. Removing subsurface soil from the source area also reduces the potential for future contamination of groundwater. Alternative 3, thermal treatment provides a permanent solution with negligible long-term O&M requirements since the organic COCs in the source area are destroyed or removed from the soil. Alternative 4, chemical oxidation provides a permanent solution with negligible long-term O&M requirements since the organic COCs in the source area are destroyed or reduced to less hazardous compounds and metals are also somewhat stabilized and rendered less likely to migrate from the soil to groundwater. All of the retained alternatives are irreversible and permanent. Although OU2 is in an area that is vulnerable to increased risk from tornadoes, severe thunderstorms, and flooding, none of the retained alternatives would be impacted by increased incidence of severe weather.

Groundwater

Alternative 3 provides long-term effectiveness by actively treating the groundwater COCs. Alternative 4 actively extracts contaminated groundwater for treatment at the POTW. Both alternatives provide permanent removal or destruction of contaminants. Alternative 4 relies on continued operation of extraction wells during remedy implementation. Alternative 2 relies on natural attenuation to achieve the RAOs and has not been demonstrated effective with lines of evidence. Current site conditions and the presence of NAPL may limit the effectiveness of Alternative 2. This area is vulnerable to increased risk from tornadoes, severe thunderstorms, and flooding. As such, Alternative 4 could be vulnerable to damage from future, more frequent severe weather events.

4. *Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment*

<u>Treatment Processes</u>
No treatment processes are proposed by any alternatives for surface soils.

Subsurface Soils Alternatives 3 and 4 propose in situ treatment technologies (thermal and stabilization, respectively) to destroy or immobilize contaminants in subsurface soil and reduce the toxicity, mobility, and volume of the contaminants.

Groundwater Alternative 3 proposes the injection of microorganisms, nutrients, and other additives into groundwater to enhance naturally occurring treatment processes. Groundwater Alternative 4 involves treatment which would take place at the POTW.

<u>Amount of contaminants that will be destroyed</u>
No contaminants would be destroyed by any of the proposed surface soil alternatives. Contaminants would either be contained or removed.

For subsurface soils, Alternative 2 would not destroy contaminants, instead it would remove subsurface soil contamination from OU2. Subsurface Soils Alternatives 3 and 4 would destroy contaminants through treatment. The amount of contaminants expected to be destroyed is greater with Subsurface Soils Alternative 3.

All of the retained alternatives for groundwater would likely destroy the same volume of contaminants, but at different rates. Groundwater Alternative 3 will destroy contaminants at a faster rate than Groundwater Alternative 2 - which is subject to uncertainty for effectiveness. Groundwater Alternative 4 technology would ultimately destroy contamination upon treatment at the POTW.

<u>Degree of expected reduction in toxicity, mobility, or volume and specification</u>
Under all of the retained Alternatives for surface soil, there would be no change to the toxicity, mobility, or volume of COCs. Alternatives 2 and 3 leave contaminants in place with a protective cap, while Alternative 4 removes and properly disposes of contaminated material.

Subsurface Soils Alternatives 3 and 4 provide significant reduction in toxicity, mobility, and volume of the organic contaminant mass. The addition of lime in Alternative 4 may also reduce the mobility of inorganic COCs, although inorganic COCs are not the primary concern in the treatment area. Subsurface Soils Alternative 2 is a containment remedy which provides no reduction in toxicity, mobility, or volume through treatment.

Groundwater Alternatives 3 and 4 provide significant reduction in toxicity, mobility, and volume of the organic contaminant mass in the groundwater through treatment. Alternative 2 provides no reduction in toxicity, mobility, or volume through treatment.

<u>Degree of irreversibility</u>
Treatment processes proposed for subsurface soils are irreversible. The treatment proposed by Groundwater Alternative 3 may result in "rebound" of contaminant concentrations in groundwater and could require additional injections.

5. ***Short-term Effectiveness***

<u>Protection of Community</u>

For surface soils, during implementation of the remedy Alternative 2 provides the least risk to the community since surface soil will remain in place and be capped with asphalt. Alternatives 3 and 4 all present risks to the community due to the excavation and transportation of contaminated soils. Surface Soil Alternative 4 presents greater risk to the community than Surface Soil Alternative 3 because off-site disposal of soil is needed. These risks can be mitigated using a health and safety plan to ensure safe and secure handling of removed surface soil.

For subsurface soils, Alternatives 2, 3, and 4 all present similar risks to the community during implementation which can be mitigated using common approaches. In-situ Chemical Oxidation (ISCO) in Alternative 4 uses strong oxidizers, which, while safe if handled properly, provide slight risk to the community should there be an accident in chemical handling.

For Groundwater, Alternatives 2, 3, and 4 all present similar risks to the community which can be mitigated using common approaches. ISCO, which uses strong oxidizers, is applied in Groundwater Alternative 3, while safe if handled properly, will provide risk to the community should there be an accident in chemical handling. Alternative 4 requires long-term permanent infrastructure improvements (extraction wells, conveyance piping, treatment system, and potentially discharge piping) which creates more potential impact to the community, although much of the infrastructure is likely to be underground.

Protection of Workers

For surface Soil, Alternative 2 provides the most limited contact for workers with contaminated soils. Beyond minor clearing and grading to create a flat surface for the asphalt cap, workers would not handle surface soil under the Surface Soil Alternative 2. Stone aggregate and the bituminous asphalt would be placed over the existing soil. This alternative is also the quickest to install and with the least amount of truck traffic. Surface Soil Alternative 3 requires slightly more potential worker exposures during implementation than Surface Soil Alternative 4. Surface Soil Alternative 4 requires workers to excavate the contaminated soils with potential exposure during excavation and loading the trucks for disposal. The number of trucks required to dispose the soil off-site generates the most truck traffic of the three Surface Soil alternatives. Surface Soil Alternative 4 requires workers to handle the contaminated soil twice, once during excavation and again during placement in the consolidation area. With properly executed Health and Safety Plans, the risks to workers for all of the options would be minimal.

Subsurface Soils Alternatives 2, 3, and 4 are all expected to have similar levels of risk to the workers due to construction activities. Alternative 4 presents risk from the oxidizing reagent, which can be dangerous if mishandled. Subsurface Soils Alternatives 3 and 4 have somewhat longer construction periods than Alternative 2. With properly executed Health and Safety Plans, the risks to workers for all of the options would be minimal.

Groundwater Alternative 2 will present the least amount of risk to workers of the Groundwater Alternatives as there will be no active treatment or construction activities. Alternatives 3 and 4 are expected to have similar levels of risk to the workers due to construction activities. Alternative 3 adds risk from the oxidizing reagent, which can be dangerous if mishandled. Alternative 4 is anticipated to have a somewhat longer construction period, due to the need to construct the treatment system, and therefore, based on time, poses slightly greater risk to workers than Alternatives 2 or 3. With properly executed Health and Safety Plans, the risks to workers for all of the options would be minimal.

Environmental Impacts

Surface Soil Alternative 2 would have low impacts on the environment as no contaminated soil would be disturbed. Alternatives 3 and 4 would impact the environment similarly since they both require heavy equipment and trucks to complete the remedial action. Traffic control and management can direct traffic away from environmentally sensitive areas that would be negatively impacted by equipment and trucks.

For subsurface soil, potential impacts for Alternative 2 are driven by the need for heavy equipment and off-site truck activity. Alternative 3 and 4 require equipment on site as well as electric power systems.

Groundwater Alternative 2 would have low impacts on the environment. Alternative 3 potentially has more impact to the environment than Groundwater Alternative 2 because of the use of a dangerous substance (the oxidizing regent) which, if mishandled or spilled, can pose a threat to the environment. Alternatives 3 and 4 have additional impacts to the environment, due to the electrical power needed to operate the systems. Alternative 4 has a larger impact than Alternatives 2 and 3 because it requires long-term pump and treat systems to be installed.

Time required to Implement Remedial Action and Achieve RAOs

Surface Soil Alternatives 2, 3 and 4 could be implemented in one construction season. All of the retained remedial alternatives would meet Soil RAOs upon construction completion.

Subsurface soil Alternatives 2 and 4 could be implemented over one or two construction seasons. Alternative 3 would take 2 construction seasons to implement. All of the retained remedial alternatives would meet Soil RAOs upon construction completion. Additionally, Alternative 4 is expected to help achieve Groundwater RAOs more quickly.

Groundwater Alternatives 2 and 3 could be implemented over one construction season. However, Alternative 4 would require a pump and treat system to remain onsite long-term. For alternative 2, Groundwater RAOs are estimated to take 20-30 years to be achieved, although there is not good information to indicate that RAOs would be met in that timeframe. Alternative 4 is estimated to take 10-20 years to achieve GW RAOs. Alternative 3 is estimated to achieve GW RAOs in 5-10 years.

6. *Implementability*

Technical Feasibility

Surface Soil Alternatives 2, 3, and 4 are all technically feasible and have been successfully used at other sites. There are many contractors in Ohio and the surrounding area who would be capable of implementing these alternatives. Alternative 4 is the easiest to implement since excavating and disposing the soil followed by backfill and restoration can be completed quickly by local contractors. The main quality control concern is excavating to the required lateral limits and depth. Alternative 2 is the next easiest to implement because it can also be completed with several local contractors in about the same time as Alternative 4. Construction of the asphalt cap needed for Alternative 3 must meet several quality control requirements including product materials and dimensions to ensure its long-term effectiveness. Alternative 3 is the most difficult to implement as surface soil must be excavated, relocated on site, and then capped. This alternative will take the longest to complete of the three Surface Soil Alternatives.

Subsurface Soil Alternatives 2, 3, and 4 are all technically feasible and have been successfully used at other sites. Alternative 2 is easily implemented and there are several contractors in the area available to conduct this work. Alternative 3, thermal conduction heating, has been used at over 75 sites, including other wood treating sites. A small number of specialized contractors have experience installing and operating these systems. These contractors have experience in the region. Several contractors with experience implementing in situ stabilization and chemical oxidation are available in Ohio and surrounding states who could implement Alternative 4.

All alternatives could face some challenges based on current site conditions. This is due in part to the age of the data collected in the RI. This will be remedied by including a robust pre-design sampling plan as part of the remedial design.

Alternative 4 is the easiest to implement as the treatment area is already generally clear of obstructions to create the sodium persulfate slurry available at nearby hydrants. Although some special equipment tooling may be required to inject and mix the amendments into the subsurface soil, there are many contractors in the region with this experience. Alternative 3 requires more pre-execution tasks to provide utilities, primarily power and discharge to the local sanitary sewer. The thermal conduction heating also relies on a specialized contractor to install and operate the system. Alternative 2 is a common remedial action with several contractors with excavation experience. Excavation of the subsurface soils to 14 feet below grade will require management of contaminated groundwater as well as shoring or sloping to maintain slope stability during excavation.

Groundwater Alternatives 2, 3, and 4 are all technically feasible and have been successfully implemented at other sites. All the alternatives face some of the same challenges (the inadequate characterization of the discrete source area(s) for targeted treatment) which would be remedied by a robust pre-design investigation. Alternative 3 also faces unique challenges due to geochemistry considerations (competing demands from non-contaminants on treatment reagents, aquifer physical properties) but these can be mitigated in the design phase. Alternative 4, while successful at some sites, has not achieved success at every site despite being operated for many years. Alternative 2 is the easiest to implement since very little site work is required. Alternative 3 requires mostly self-sufficient equipment. Alternative 4 requires installation of utilities for long-term operation.

<u>Administrative Feasibility</u>

Surface Soil Alternatives 2, 3 and 4 are all expected to have similar administrative feasibility (excluding cost considerations, which is evaluated separately). Alternative 2, and 3 are likely to have additional administrative challenges, due to the long-term O&M requirements.

Subsurface Soil Alternatives 2, 3 and 4 are all expected to have similar administrative feasibility (excluding cost considerations, which is evaluated separately).

Groundwater Alternatives 2, and 3 are all expected to have similar administrative feasibility (excluding cost considerations, which is evaluated separately). Alternative 4 is likely to have additional administrative challenges, due to the long-term O&M requirements.

Availability of Required Resources

Surface Soil Alternative 2 would require periodic seal coating of the asphalt surface as well as other maintenance to repair any degradation or damage to the surface. Alternative 3 construction tasks are common to the environmental construction industry and several qualified firms are in Ohio. Some clearing and grading would be required along the eastern side of the site to construct the consolidation area. A review of the remedy protectiveness would need to be completed every 5 years for Alternatives 2 and 3. The construction tasks needed for Surface Soil Alternative 4 are common to the environmental construction industry and several qualified firms are in Ohio. Several Subtitle D landfills are also located within 50 miles of the site.

Subsurface Soil Alternative 2 construction tasks are common to the environmental construction industry and several qualified firms are in Ohio. Several Subtitle D landfills are also located within 50 miles of the site. Alternative 3 will require additional pre-design sampling prior to implementation. Electric power would need to be provided to the site to power the heating elements as well as the liquid and vapor treatment systems. Power lines are in the site vicinity, but the local electric utility would need to provide a transformer with hookup. A connection to the local sanitary sewer is also required. There is a sewer line near the southeast corner of the site. For Alternative 4, some specialized equipment is required to inject and mix the sodium persulfate and lime into the soil. Precautions may be required, such as a buffer, near the gas line along Holland Road. These requirements can be incorporated into the remedial design.

Groundwater Alternative 2 will require additional groundwater monitoring wells to be installed. Routine sampling of groundwater to evaluate natural attenuation would begin on a quarterly basis and potentially shift to biannual or annual if COC concentrations decline. Additional sampling and groundwater modeling would need to be completed to provide a better estimate using current groundwater concentrations and degradation rates. For Alternative 3, a water supply is required to mix with the dry treatment compounds to create an injectable slurry. Water is available from water hydrants at the site. The injection area is already mostly open, and the injection equipment is small enough to maneuver between the existing trees. Alternative 4 requires installation of the groundwater extraction wells and an above ground treatment system. This construction can be performed by local contractors with similar experience. Power and sewer utilities will need to be installed for the system to operate. For all groundwater alternatives, there are contractors in Ohio or the surrounding states who will be able to implement the selected alternative.

7. *Cost*

An overview of the cost analysis performed for these Alternatives and the detailed cost breakdowns are presented in Appendix F of the FS report. Total costs are summarized below in Table 6.

Table 6: Total estimated cost of remedial alternatives

Media	Alternative No.	Alternative Name	Total Expected Cost (Millions)
Surface Soil	1	No Action	$0
	2	Asphalt Cap	$1.67
	3	Excavation & Onsite Consolidation	$2.64
	4	Excavation & Offsite Disposal	$3.32
Subsurface Soil	1	No Action	$0
	2	Excavation & Offsite Disposal	$8.82
	3	Thermal Conduction Heating	$8.70
	4	In-Situ Mixing & Stabilization	$6.62
Groundwater	1	No Action	$0
	2	MNA	$3.04
	3	Enhanced Biodegradation	$2.65
	4	Extraction & Treatment	$5.79

Modifying Criteria: Community & State Acceptance

Community acceptance

Community Acceptance will be evaluated after the public comment period. EPA will address public comments in the Responsiveness Summary of the ROD for OU2.

State Acceptance

As the state support agency, Ohio EPA provided input throughout the RI/FS process. Ohio EPA has indicated that it supports Surface Soil Alternative 4, Subsurface Soils Alternative 4, and Groundwater Alternative 3 as the Preferred Alternatives.

I. EPA'S PREFERRED ALTERNATIVE

EPA's Preferred Alternatives are Surface Soil Alternative 4, Subsurface Soils Alternative 4, and Groundwater Alternative 3. At this time, EPA finds that these alternatives best satisfy the evaluation criteria. EPA's selected remedy could change based on information it receives during the public comment period.

Surface Soil Alternative 4 (Excavation & Off-site disposal):
Surface Soil Alternative 4 is expected to meet the RAOs more quickly and provide the greatest flexibility for site redevelopment relative the Surface Soil Alternatives 2 and 3. Alternative 4 requires no long-term maintenance. Alternative 2 is the least expensive, but the asphalt cap would need to be incorporated into the redevelopment plan and be maintained to ensure long-term effectiveness and permanence. Alternative 3 is the most difficult to implement as surface soil must be excavated, relocated on site, and the capped. This alternative will take the longest to complete and is less effective in the long-term than Surface Soil Alternative 4. Alternative 3 would require long-term maintenance. For these reasons, Alternative 4 is the preferred Surface Soil remedy.

Subsurface Soil Alternative 4 (In-situ Mixing & Stabilization):
Alternative 4 In Situ Stabilization and Chemical Oxidation with Sodium Persulfate and Lime, is the least expensive and easiest remedy to implement that reduces toxicity, mobility, and volume of contaminants through treatment. Alternative 3 would reduce toxicity, mobility, and volume of the contaminant mass but is more expensive and more difficult to implement than Alternative 4. Alternative 2 is the most expensive Subsurface Soil Alternative with the highest short-term disruption because of the high number to truck trips to dispose the subsurface soil and deliver backfill materials. For these reasons, Alternative 4 is the preferred Subsurface Soil remedy.

Groundwater Alternative 3 (Enhanced Biodegradation):
Alternative 3 is relatively easy to implement with greater short- and long-term effectiveness and lesser cost than the other Groundwater Alternatives. Alternative 2 may not be able to achieve the groundwater RAOs. Alternative 4 is expensive, may require a long time to meet the site RAOs, and relies on continued operation to be effective in the long-term. For these reasons, Alternative 3 is the preferred Groundwater remedy.

Based on the information available at this time, EPA believes the Preferred Alternatives meet the threshold criteria and provides the best balance of tradeoffs among the alternatives evaluated with respect to balancing and modifying criteria. EPA expects the Preferred Alternatives to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

The Preferred Alternatives provide long-term and permanent protection against exposure to Site-related contaminants with the combination of off-site disposal, soil and groundwater treatment, and ICs. EPA has identified NAPL as a principal threat waste at the Site. Subsurface Alternative 4 and Groundwater Alternative 3 will address and treat the NAPL at the Baker Woods Creosoting Site.

Table 7: EPA's Preferred Alternatives for BWC with estimated costs

Exposure Area	Alternative No.	Alternative Name	Cost
Surface Soil	4	Excavation and Off-site Disposal	$3,320,000
Subsurface Soil	4	In-situ Stabilization and Oxidation	$6,620,000
Groundwater	3	Enhanced Biodegradation	$2,650,000
		Total Cost to Implement	$12,590,000

J. COMMUNITY PARTICIPATION

EPA, in consultation with Ohio EPA, will evaluate public reaction to the Preferred Alternative during the public comment period on this Proposed Plan before selecting a remedy for the Site. Based on new information or public comments, EPA may modify its Preferred Alternative or choose other alternatives. EPA encourages the public to review and comment on all of the cleanup alternatives.

To assure that the community's concerns are being addressed, a public comment period lasting thirty (30) calendar days will open on July 11, 2022, and close on August 10, 2022. During this time the public is encouraged to submit comments to EPA on the Proposed Plan. Comments can be submitted using any of the following options:

- By website, directly at: www.epa.gov/littlesciotoriver
- By email to palomeque.adrian@epa.gov
- By mail to: Adrian Palomeque
  U.S. EPA Region 5
  External Communications Office
  77 W. Jackson Blvd. (RE-19J)
  Chicago, IL 60604-3590

Due to the ongoing COVID-19 pandemic, EPA has altered its public outreach methods to ensure the safety of all residents. EPA has posted to its website for the Site (www.epa.gov/littlesciotoriver) a pre-recorded video presentation summarizing the investigative findings for OU2, a factsheet summarizing the proposed plan, and this proposed plan.

An Administrative Record has been created for OU2 and will be completed upon issuance of the Record of Decision. Site documents, including Administrative Record documents, can be found on EPA's website for the Site (www.epa.gov/littlesciotoriver) or at the following locations:

Marion Public Library
445 E. Church Street
Marion, Ohio
(740) 387-0992
Mon-Wed: 9 a.m. to 7 p.m.
Thu-Fri: 9 a.m. to 6 p.m.
Sat: 10 a.m. to 3 p.m.

EPA Region 5 Records Center
77 W. Jackson Boulevard (SRC-7J)
Chicago, Illinois 60604
312-886-0900
Mon-Fri: 8 a.m. to 4 p.m. – Call for appointment

EPA will respond in writing to all significant comments in a Responsiveness Summary, which will be part of the ROD. EPA will announce the selected cleanup alternative in local newspaper advertisements and will place a copy of the ROD on EPA's website at www.epa.gov/littlesciotoriver and in the local information repositories.

In addition, questions about the Proposed Plan and requests for information can be sent via email to Mitchell Latta (latta.mitchell@epa.gov) or Adrian Palomeque (palomeque.adrian@epa.gov).

Appendix Materials

Appendix A

- Figure 1 – Site Location Map

Appendix B

- Figure 2 – Site Features Map

Appendix C

- Figure 3a – Estimated Extent of Groundwater Contamination
- Figure 3b – Estimated Extent of Surface Soil Contamination
- Figure 3c – Estimated Extent of Subsurface Soil Contamination

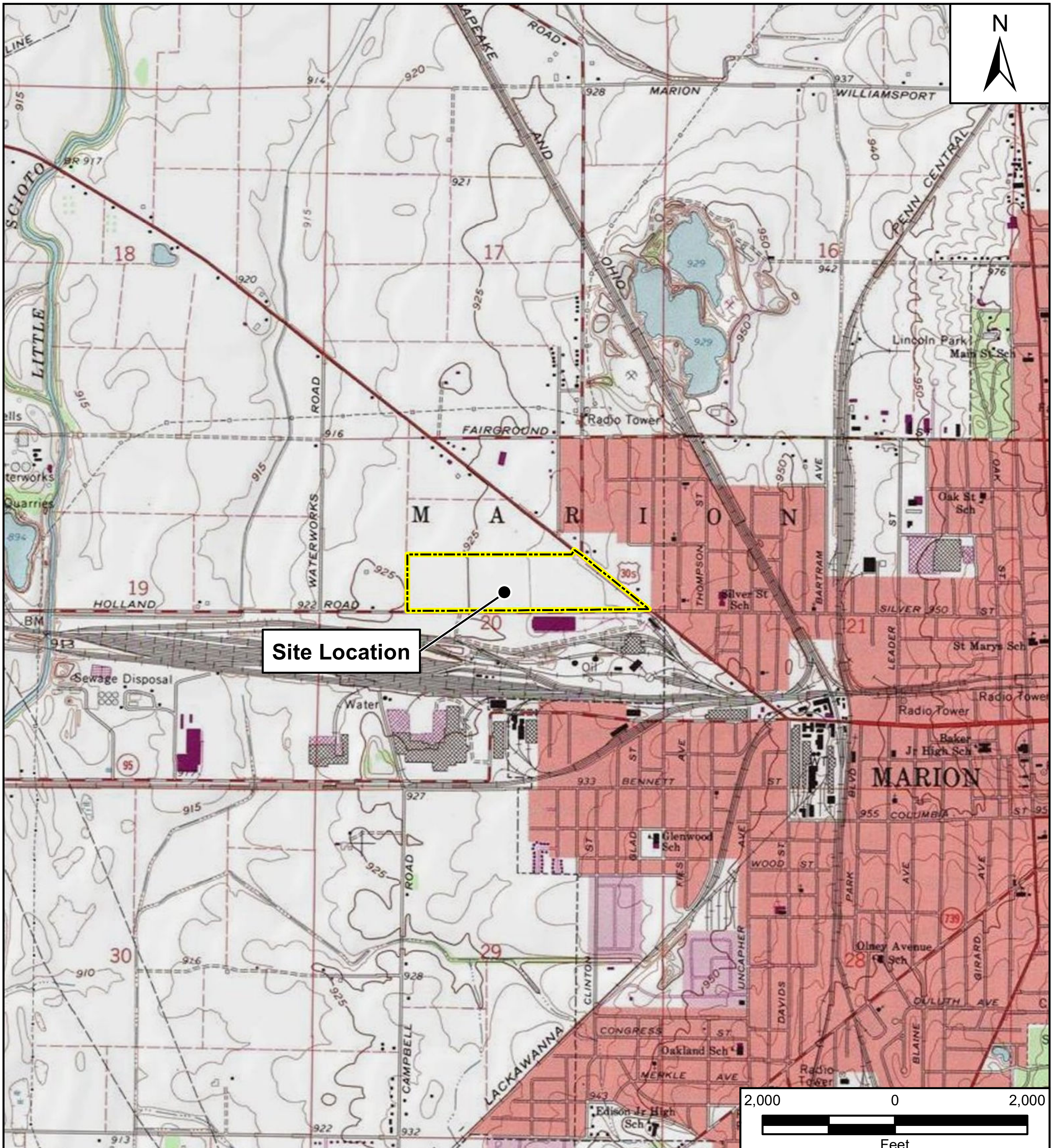
Appendix D

- Figure 4 – Conceptual Site Model

Appendix E

- Applicable Or Relevant and Appropriate Requirements

Appendix A -Site Location Map



Reference Map

Legend

Baker Wood Creosoting Property Boundary

Source: Source: USGS 7.5-Minute Series Topographic Quadrangle. Marion, Ohio, 1978

BAKER WOOD CREOSOTING SITE
MARION, MARION COUNTY, OHIO

FIGURE 1-1
SITE LOCATION MAP

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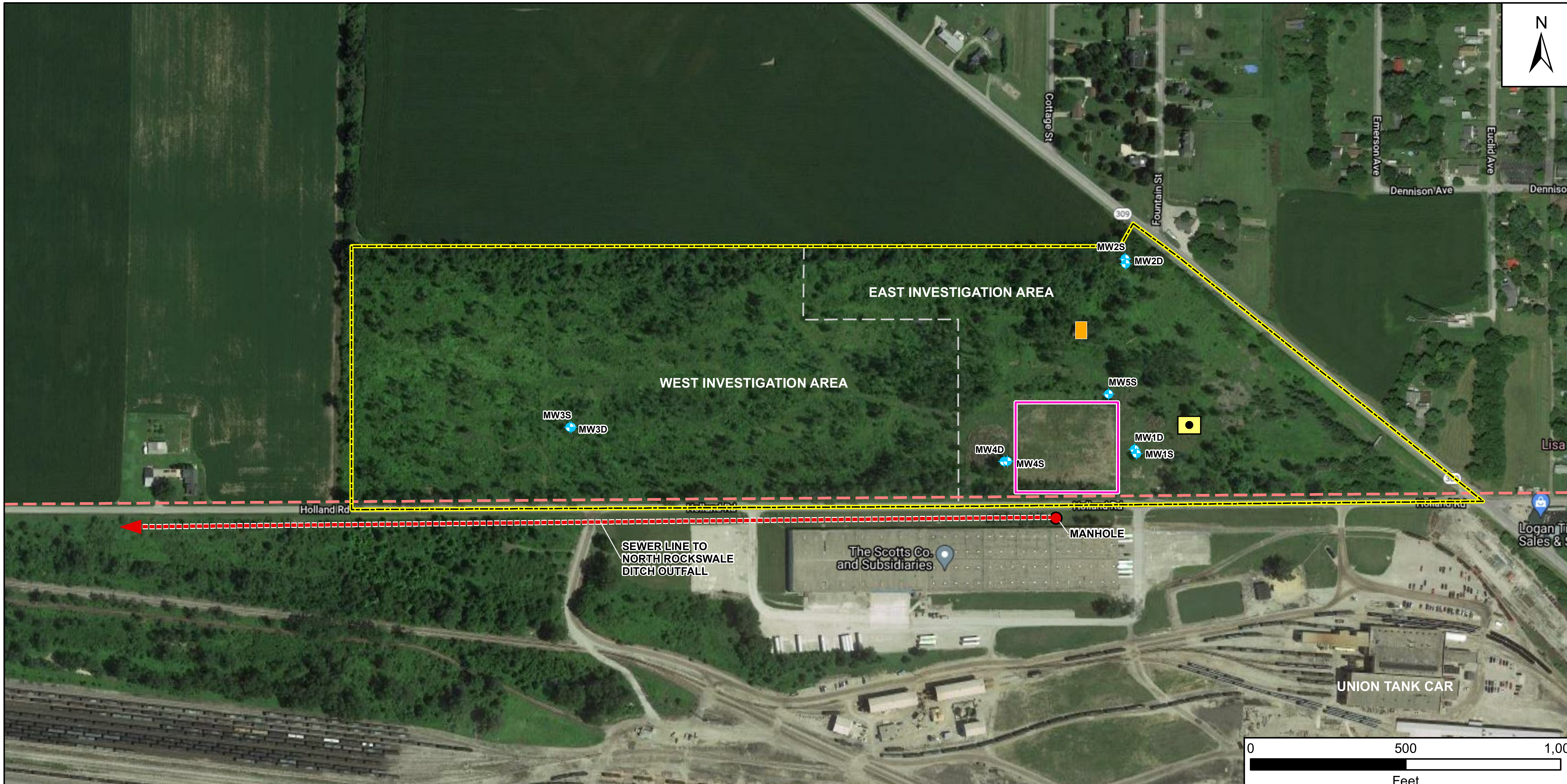
Appendix B – Site Features Map



LEGEND

- MONITORING WELL LOCATION
- SLAG PILE LOCATION
- COLUMBIA GAS LINE
- SEWER LINE
- MANHOLE
- SITE BOUNDARY
- METAL BUILDING
- BIOREMEDIATION AREA

BAKER WOOD CREOSOTING SITE
MARION, OHIO

FIGURE 1-2
BWC SITE FEATURES MAP

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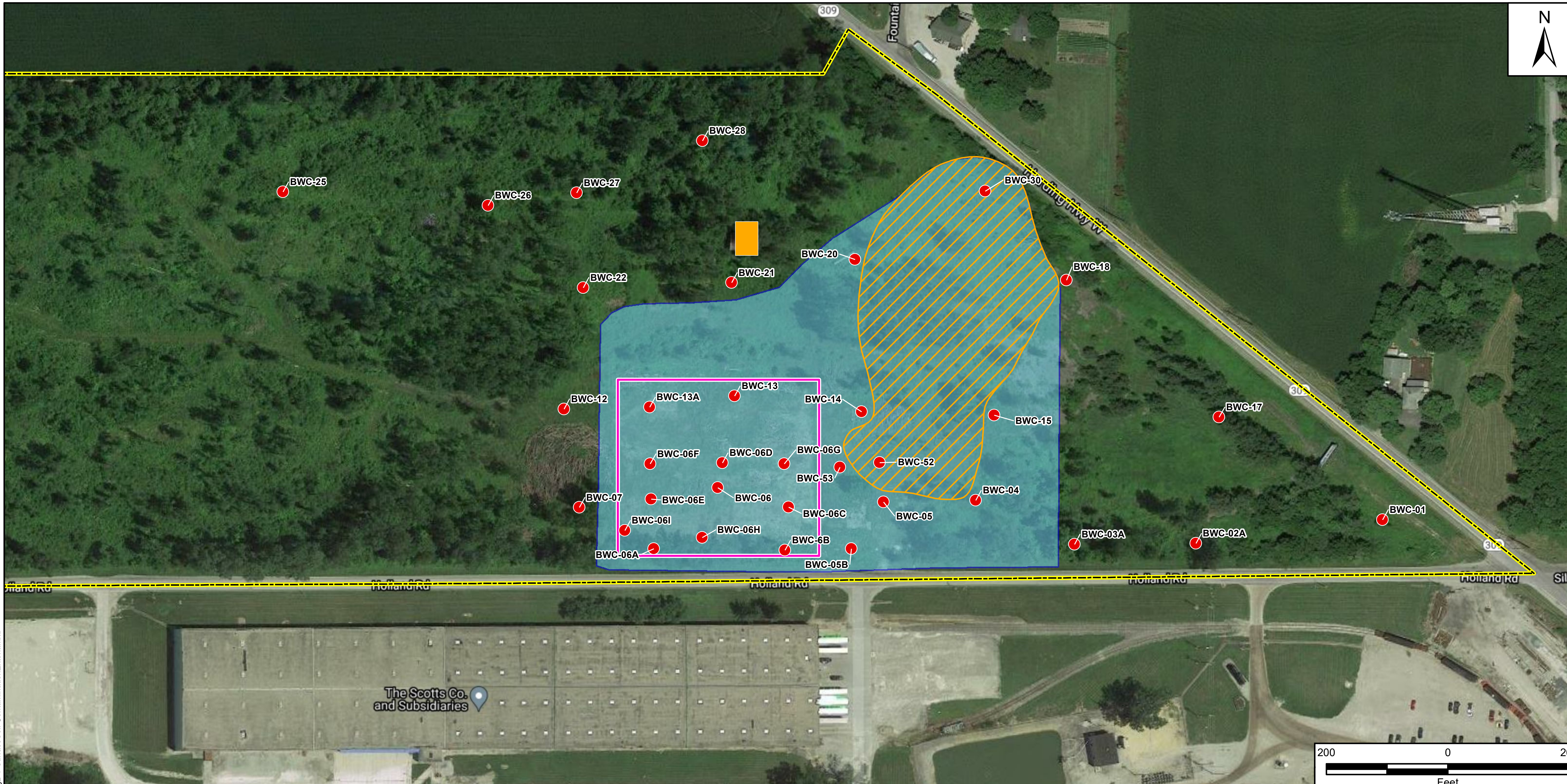
Appendix C – Estimated Extent of Contamination



Legend

- SOIL BORING LOCATION
- ESTIMATED SURFACE EXTENT OF SOIL CONTAMINATION EXCEEDING 10-5 RISK (131,909 SQ. FT.)
- ESTIMATED SURFACE EXTENT OF SOIL CONTAMINATION EXCEEDING 10-6 RISK (406,839 SQ. FT.)
- SITE BOUNDARY
- METAL BUILDING
- BIOREMEDIATION AREA

BAKER WOOD CREOSOTING SITES
MARION, MARION COUNTY, OHIO

FIGURE 2-1
EXTENT OF SURFACE SOIL CONTAMINANTS

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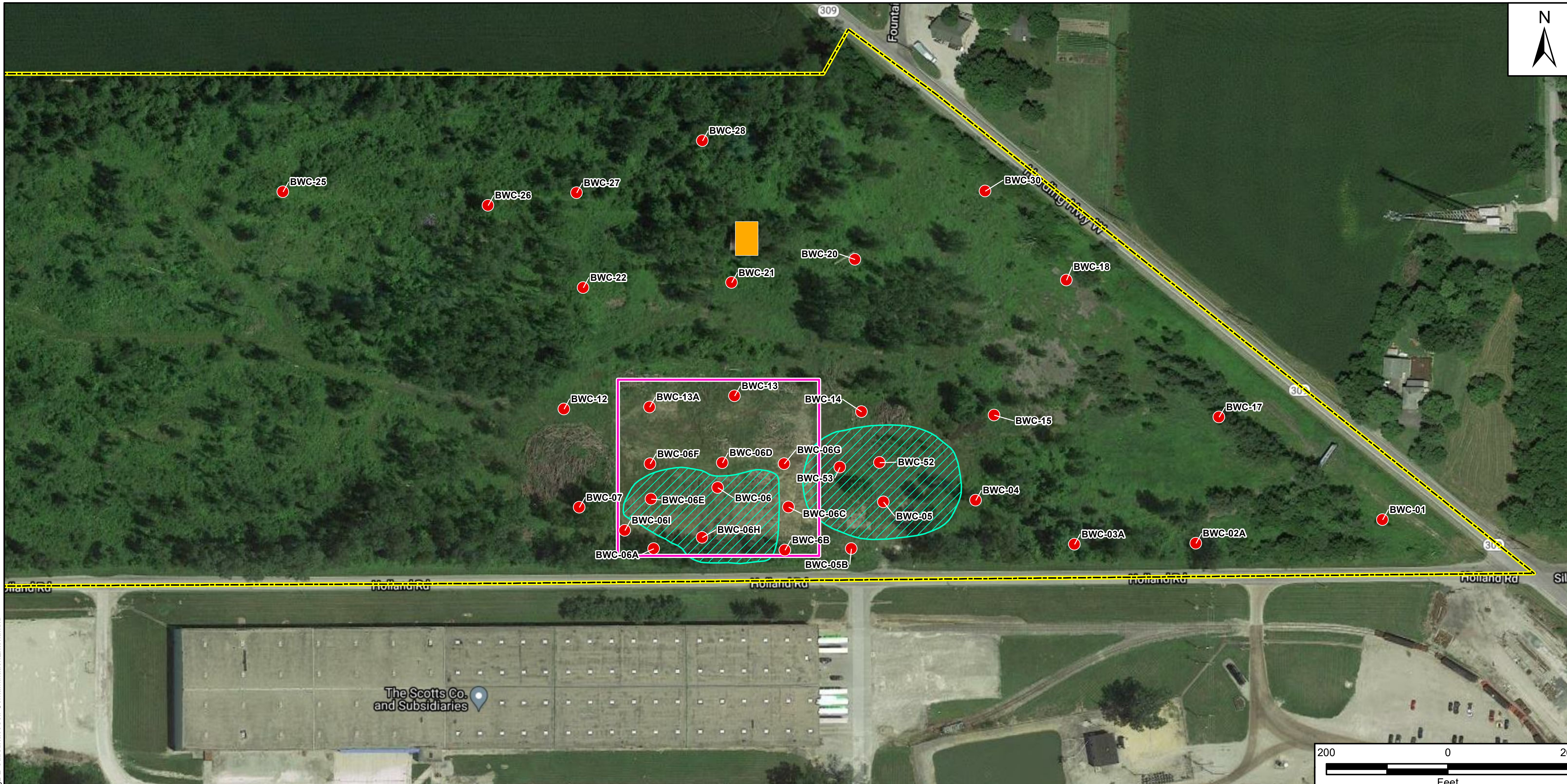

Legend

- SOIL BORING LOCATION
- ESTIMATED SUB-SURFACE EXTENT OF SOIL COMTAMINATION (72,576 SQ. FT.)
- SITE BOUNDARY
- METAL BUILDING
- BIOREMEDIATION AREA

BAKER WOOD CREOSOTING SITES
MARION, MARION COUNTY, OHIO

FIGURE 2-2
EXTENT OF SUBSURFACE SOIL CONTAMINANTS

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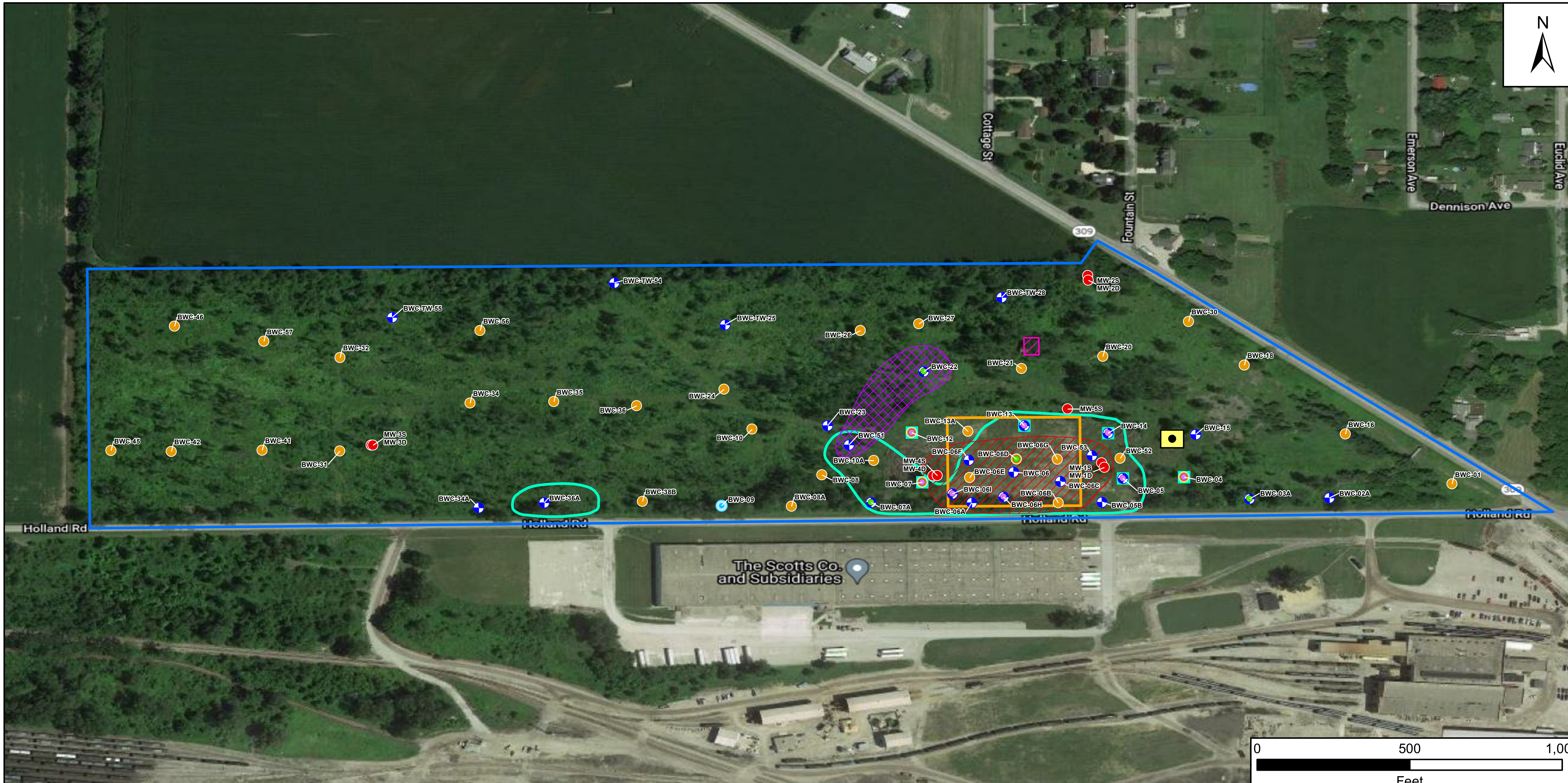
6/17/2021



CHROMIUM SAMPLE AND TEMPORARY WELL LOCATION

PESTICIDE SAMPLE LOCATION

CHROMIUM SAMPLE LOCATION

SOIL BORING AND PESTICIDE SAMPLE LOCATION

SVOC - SEMI-VOLATILE ORGANIC COMPOUNDS
VOC - VOLATILE ORGANIC COMPOUNDS

MONITORING WELL LOCATION

SOIL BORING LOCATION

TEMPORARY WELL LOCATION

SLAG PILE LOCATION

METAL BUILDING

BIOREMEDIATION/TREATMENT AREA

SITE BOUNDARY

SVOCs EXCEEDING THE TAP WATER SCREENING LEVEL

VOC EXCEEDING THE TAP WATER SCREENING LEVEL

METALS EXCEEDING THE MAXIMUM CONTAMINANT LEVEL

BAKER WOOD CREOSOTING SITE
MARION, OHIO

FIGURE 2-3
GROUNDWATER RESULTS FOR
SVOCS, VOCS, AND METALS
EXCEEDING TAP WATER SCREENING LEVELS

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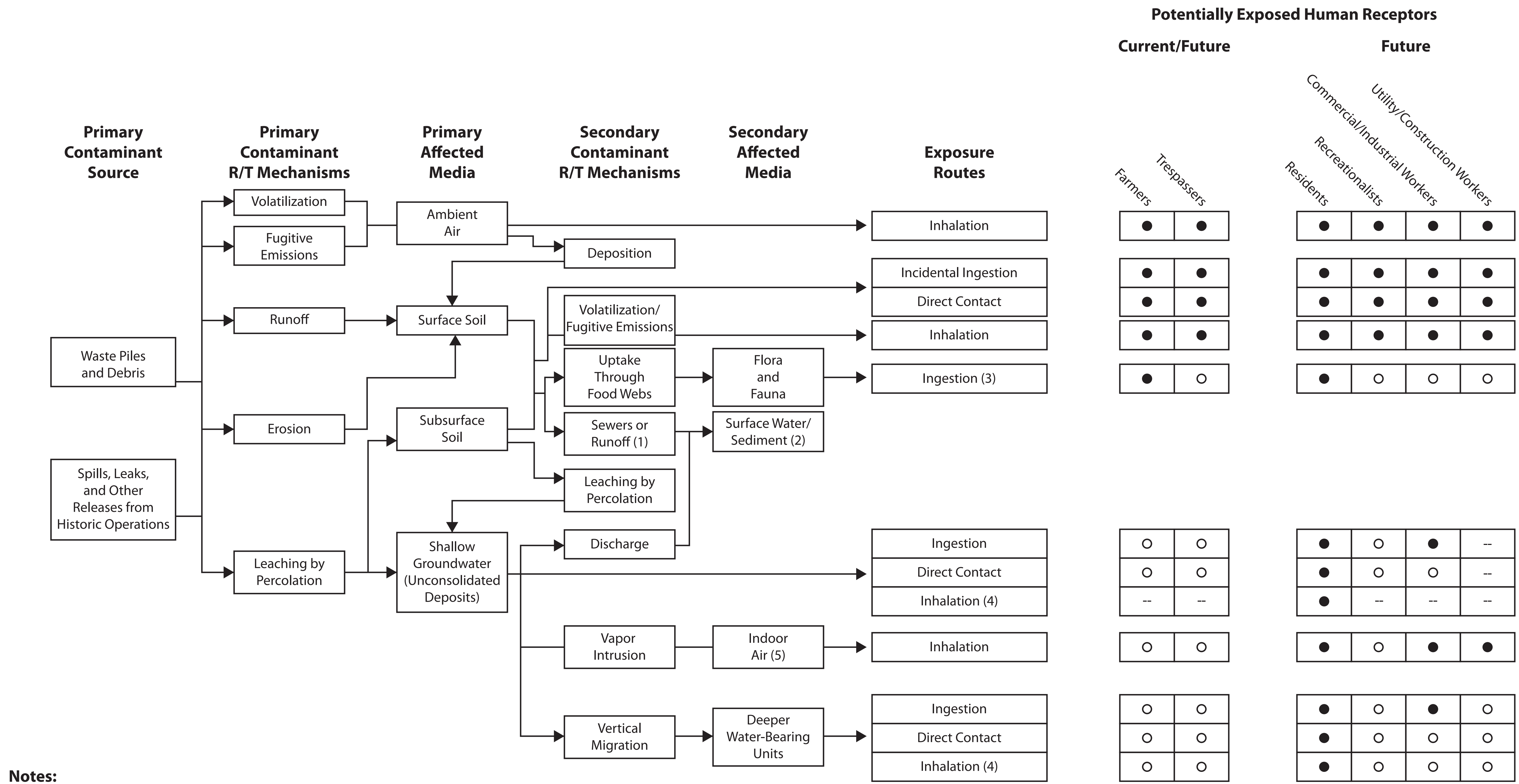
6/17/2021 G:\G\1852\343 Baker Wood\mxd\2021-05\Fig2-3-GWExceedances-Metals_SVOCS_VOC.mxd m.banh

Appendix D – Conceptual Site Model



Notes:

HHRA = Human health risk assessment
R/T = Release/transport
● = Potentially complete exposure pathway - retain for quantitative analysis
○ = Incomplete exposure pathway - will not be considered in the HHRA
-- = Potentially complete, but insignificant exposure pathway - will not be retained for quantitative analysis

1. Contaminant transport through sewers had occurred in the past; It is currently unknown as to whether any sewers or drainage ditches still exist as secondary R/T mechanisms.
2. Source, pathway, exposure relatvie to impacted surface wter and sediment in the LSR is addressed in the LSR CSM (SulTRAC 2009).
3. For the purposes of the HHRA, only ingestion of home or farm grown food stuffs will be evaluated.
4. Volatile compounds present in groundwater may volatilize, migrate through the vadose zone and enter the ambient (outdoor) air. For all receptors, this exposure pathway is expected to be insignificant.
5. For utility/construction workers indoor air is considered to be air within a trench.

BAKER WOOD CREOSOTING SITE
MARION, OHIO

FIGURE 59
HUMAN HEALTH
CONCEPTUAL SITE MODEL

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APPENDIX E
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

SUMMARY OF POTENTIAL ARARs FOR BAKER WOOD CREOSOTING PORTION OF SITE

Description	Prerequisite for ARAR	Type of ARAR	Requirement	Citation	Comments
Federal Requirement					
Groundwater	Water Quality Criteria	Chemical-specific	Implements a system to impose effluent limitations on, or otherwise prevent, discharges of pollutants into any waters of the United States from any point source	CWA of 1977 33 U.S.C. Subsection 1251, et seq.	May be applicable if groundwater discharges to surface water
	Drinking Water Quality	Chemical-specific	Establishes the protection of drinking water quality in the United States. Focused on all waters actually or potentially designed for drinking use, whether from above ground or underground sources.	SDWA of 1974 42 U.S.C. Subsection 300f et seq.	May be applicable if there is future potable water use
	National Primary Drinking Water Regulations and Implementation	Chemical-specific	Establishes MCLs which are health risk-based standards for public water systems	SDWA of 1974 40 CFR 141 and 142	
	National Secondary Drinking Water Regulations and Implementation	Chemical-specific	Establishes welfare-based secondary standards for public water systems	SDWA of 1974 40 CFR 143	
Source Material	Hazardous Waste Management	Action-specific	Management of generation, treatment, storage, disposal, and transport of hazardous waste	RCRA of 1976 Hazardous Waste Management	May be applicable if alternatives generate waste that is characterized or listed hazardous waste
		Action-specific	Provides control of hazardous waste by imposing management requirements on generators and transporters of hazardous waste and upon owners and operators of Treatment, Storage and Disposal facilities. Also sets forth framework for management of non-hazardous waste. HSWA requires phasing out land disposal of hazardous waste	RCRA of 1976 42 U.S.C Subsection 6901 et seq.	May be applicable for alternatives that involve treatment, storage, or disposal of hazardous waste on site. Other provisions may be applicable for hazardous waste management on site.
	Identification of Hazardous Waste	Action-specific	Identifies wastes subject to regulation	RCRA of 1976 40 CFR 261	May be applicable to alternatives that generate hazardous waste

Description	Prerequisite for ARAR	Type of ARAR	Requirement	Citation	Comments
	Standards for Generators	Action-specific	Establishes regulation covering activities of generators of hazardous wastes. Requirements include ID number, record keeping, and use of uniform national manifest	RCRA of 1976 40 CFR 262.10-40	May be applicable if RCRA hazardous waste is generate on site to be managed off site
State Requirement					
Groundwater	Act of Pollution Prohibited	Action-specific	Pollution of waters of the state is prohibited	ORC, DSW Section 6111.04	May be applicable to alternatives that involve contaminated ground or surface water.
	Water Pollution Control Requirements – Duty to Comply	Action-specific	Prohibits failure to comply with requirements of Sections 6111.01 to 6111.08 or any rules, permit, or order issued under those sections	ORC, DSW Section 6111.07 (A,C)	May be applicable to alternatives that involve contaminated ground or surface water
	Monitoring Well	Action-specific	Standards for design and closure of wells, compliance with DDAGW guidance	ORC, GW Section 3754-9-03 (A-C)	May be applicable to alternatives that result in the installation of groundwater wells
	Well Siting	Location-specific	Mandates that groundwater wells be: A) located and maintained so as to prevent contaminants from entering well, B) located so as to be accessible for cleaning and maintenance	ORC, GW Section 3754-9-04 (A-B)	
	Well Construction	Action-specific	Specifies minimum construction requirements for new groundwater wells regarding the casing material, casing depth, potable water, annular spaces, use of drive shoe, openings to allow water entry, contaminant entry	ORC, GW Section 3754-9-05 (A1, B-H)	
	Well Construction, Specific Geologic Conditions	Location-specific	Establishes specific requirements for wells in different types of aquifers	ORC, GW Section 3754-9-06 (A)	
	Well Grouting for Construction of Closure	Action-specific	Establishes specific grouting procedures	ORC, GW Section 3754-9-07 (A-C)	

Description	Prerequisite for ARAR	Type of ARAR	Requirement	Citation	Comments
	Maximum Contaminant Levels for Inorganic Chemicals	Chemical-specific	Presents maximum contaminant levels for inorganics	ORC, DW Section 3745-81-11 (A, B, C)	May be applicable to alternatives that involve contaminated ground or surface water that is either being used or has the potential for use as a drinking water source
	Maximum Contaminant Levels for Organic Chemicals	Chemical-specific	Presents maximum contaminated levels for organics	ORC, DW Section 3745-81-12 (A, B, C)	May be applicable to alternatives that involve contaminated ground or surface water that is either being used or has the potential for use as a drinking water source
	Inorganic Contaminant Monitoring Requirements	Chemical-specific	Presents monitoring requirements for inorganic contaminants	ORC, DW Section 3745-81-23 (A-E)	May be applicable to alternatives that involve contaminated ground or surface water that is either being used or has the potential for use as a drinking water source
	Organic Contaminant Monitoring Requirements	Chemical-specific	Presents monitoring requirements for organic contaminants	ORC, DW Section 3745-81-24 (A-E)	May be applicable to alternatives that involve contaminated ground or surface water that is either being used or has the potential for use as a drinking water source
	Analytical Techniques	Chemical-specific	Presents general analytical technique for MCLs.	ORC, DW Section 3745-81-27 (A-E)	May be applicable to alternatives that involve contaminated ground or surface water that is either being used or has the potential for use as a drinking water source

Description	Prerequisite for ARAR	Type of ARAR	Requirement	Citation	Comments
Source Material	Waste Specific Prohibitions – Wood Treatment	Action-specific	Restrictions on disposal of wood treatment wastes. Requirements for treatment prior to disposal	ORC, HW Section 3745-270-30 (A-E)	May be applicable to alternatives that dispose of waste associated with former wood treatment operations
Soil	Disturbances Where Hazardous or Solid Waste Facility Has Operated	Action-specific	Requires that a detailed plan be provided to describe how any proposed filling, grading, excavating, building, drilling or mining on land where a hazardous waste facility was operated will be accomplished	ORC, DSIWM Section 3745-27-13 (A-C)	May be applicable to alternatives that involve activities in areas where hazardous waste had been managed
	Generic Numerical Standards	Chemical-specific	Voluntary Action Program cleanup values for soil, drinking water and surface water	ORC, VAP Section 3745-300-08 (A-E)	May be applicable to alternatives that involve contaminated soil
	Soil and Erosion Control	Action-specific	Establishes standards to achieve a level of management and conservation practices that would control wind or water erosion of soil and minimize the degradation of water resources by soil sediment in conjunction with land grading, excavation, filing or other soil disturbing activities on land be used or being developed for non-farm commercial, industrial, residential, or other non-farm purposes.	ORC, DSWR Section 1501-15-1	May be applicable to alternatives that involve excavation of soil

Notes:
APC = Air Pollution Control
ARAR = Applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CWA = Clean Water Act
DSIWM = Division of Solid and Infectious Waste Management
DSW = Division of Surface Water
DSWR = Division of Soil and Water Resources
DW = Drinking Water
GW = Groundwater
HW = Hazardous Waste
MCL = Maximum Contaminant Levels
ORC = Ohio Revised Code
RCRA = Resource Conservation and Recovery Act
SDWA = Safe Drinking Water Act
U.S.C. = United States Code
VAP = Voluntary Action Program